Mamiya

SERVICE INSTRUCTIONS

for

Mamiya M645
M645 1000S

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Mamiya
CAMERA CO., LTD.
TOKYO, JAPAN

S.1.78-10-M645

General Specifications for *Mamiya* M645

General Specification for Mamiya M645

Camera body

Camera Type :

6 x 4.5cm electronic focal-plane shutter SLR.

Film Type :

120 roll-film for 15 exposures,
220 roll-film for 30 exposures

Standard Lenses :

Mamiya-Sekor C (multi-coated)
80mm f/1.9, automatic diaphragm,
with meter coupler,67mm filter size
Mamiya-Sekor C (multi-coated)
80mm f/2.8, automatic diaphragm,
with meter coupler,58mm filter size

Lens Mount :

Mamiya M645 bayonet mount

Shutter : M645 1000S

B,8--1/1000 sec.
Moving Coil Electronic Focal-Plane Shutter,
FP and X (1/60 sec.) synchronization,
Shutter release lock and shutter speed dial lock provision

M645 500

B,8--1/500 sec.
Moving Coil Electronic Focal-Plane Shutter,
FP and X (1/60 sec.) synchronization,
Shutter release lock provision

Battery Type :

One 6V silver-oxide battery
(Eveready 544, UCAR 544, Mallory PX28)

Focusing Method :

Each Mamiya-Sekor lens is equipped with its own helicoid focusing mount

Focusing Screen :

The standard focusing screen, which is interchangeable, has three focusing aids, a central split-image rengefinder spot (wedge set at a 45° angle) surrounded by a micro-prism collar and outer ground glass ring.
A Fresnel lens assures corner-to-corner brightness, and 94% of the picture-taking area is visible.

Mirror :

Instant return, with mirror lock-up provision

Film Transport : For M645 1000S

A single revolution of the interchangeable film advance crank transports the film. The camera is equipped with double exposure prevention, but multiple exposure can be easily made.

For M645 500

Film advance knob equipped with crank, film transported with single turn of film advance crank.

Exposure Counter :

Progressive type, automatic reset, automatic changeover with insertion of 120/220 roll-film inserts

Battery Check :

Depressing B.C. button illuminates green L.E.D. if battery condition is satisfactory.

Multiple-Exposure :

Lowering multiple-exposure lever makes multiple-exposures possible; exposure counter does not move during multiple-exposures.

Delayes Shutter Release : For only M645 1000S

Variable time delay of 5-10 seconds.

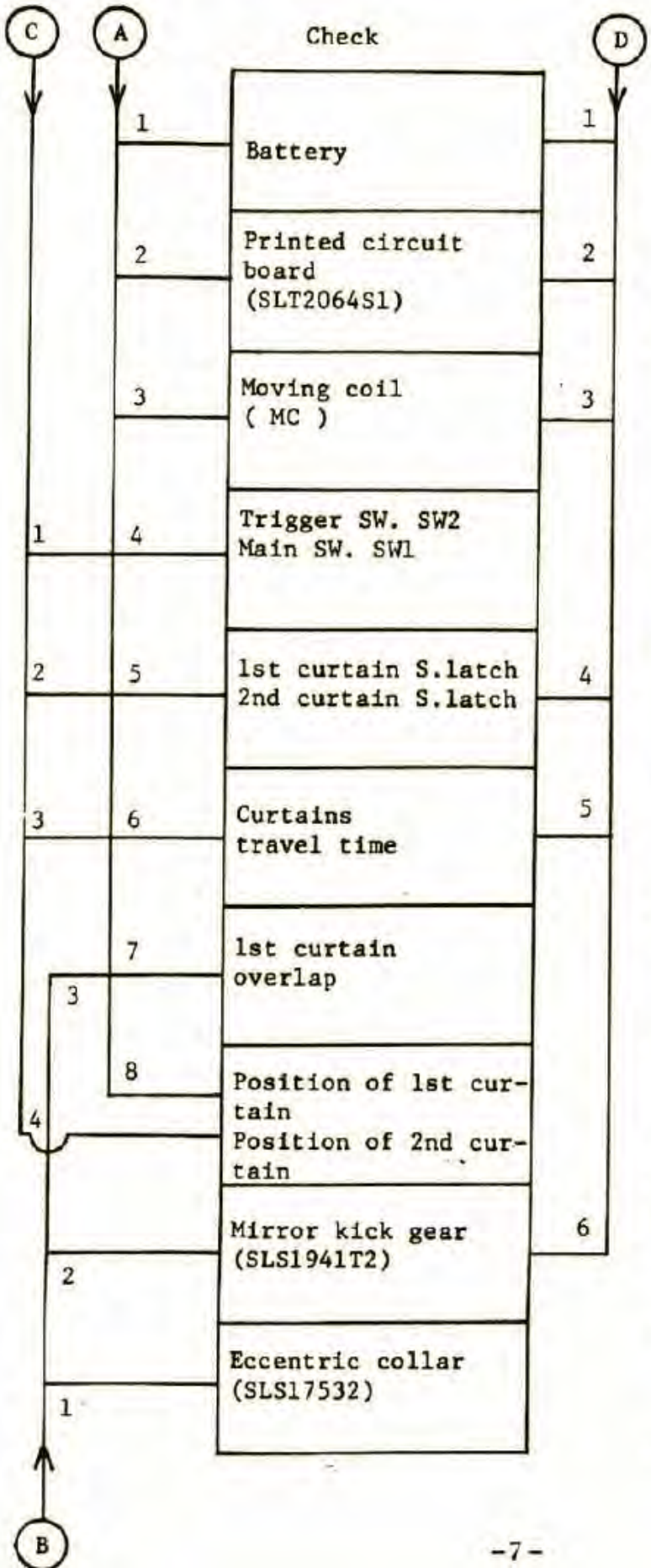
Depth-of-Field Preview Lever : For only M645 1000S

Spring-loaded, self-returning.

Trouble Shooting for Mamiya M645

No. 1 Shutter speed

※ (A) Inaccurate Shutter speed at 1/1000ms (SLS 1/500ms)
(B) Difference Shutter speed at Mirror UP
(C) Shutter runs,but not exposed (Shutter Tester indication numeral not stop)
(D) 2nd Curtain not run



Malfunction of Bulb

(See 5-4)

- SLS2045T1 Bulb switch lever
- Contact efficiency of Brush
- SW 3. Bulb Switch

X.synchro. contact

(See 5-3)

- Shutter bounce and speed
- Delay time

1st curtain bounce

(See 4-4)

- Check curtain travel time
- SLS1845T1 X.Gear position
- SLS18652 Spring, out of position
- Remaining Curtain metal at 1/1000 (SLS 1/500) and B

BC.lamp not illumimate

(See 8-4)

- Battery voltage
- Current of Battery chamber
- Current to BC circuit
- Change BC.lamp

No.3 Film transport

Overlap between exposure frames Lack of last exposure frame

- Check of first exposure frame (See 7-9)
- Engagement of SLS1554T1 Film counter gear and Dividing device (See 7-7)
- Position of SLS15842 Stop lever (See 7-8)
- Slip of F.clutch wheel (See 7-6)

Film winding is stopped on way from "S" to No.1

- Position of SLS15842 Stop lever Adjusting SLS15861 Ecc. collar (See 7-2,7-8)
- Installing SLS14201 MS.clutch disk (See 4-2)

Film counter not reset to its start position

(See 7-5)

- SLS15631 Spring out of position
- SLS15831 Release lever out of position
- Turning of Dividing device SLS1541T1

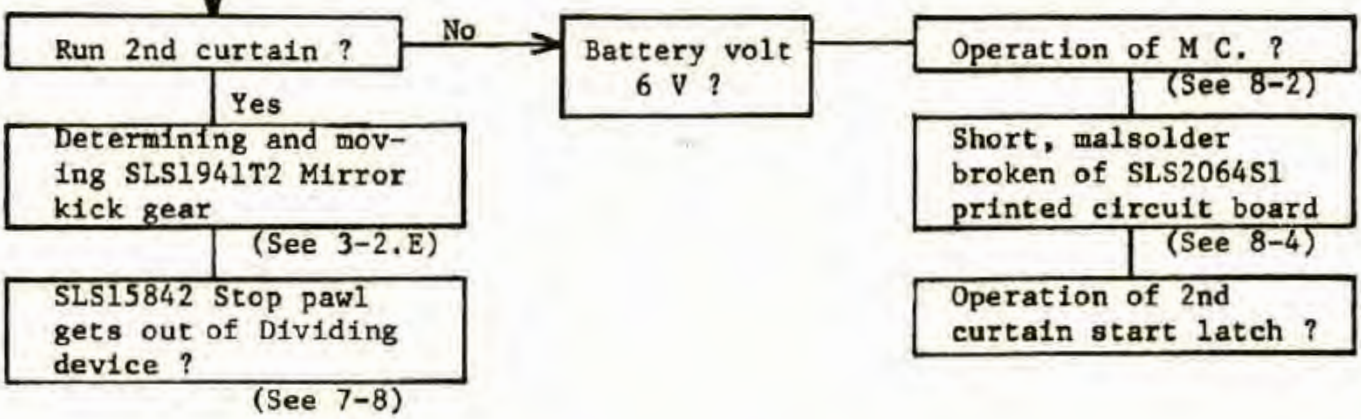
Not advance film exposure counter

- Out of position of spring of Friction wheel in roll-film insert
- Engaging SLS4182T1 Friction shaft gear with SLS1531S1 Film counter gear No.1
- Out of position of SLS15381 spring
- Pawl of SLS15842 Stop lever interferes turning of SLS 1541T1 Dividing device (See 7-8)

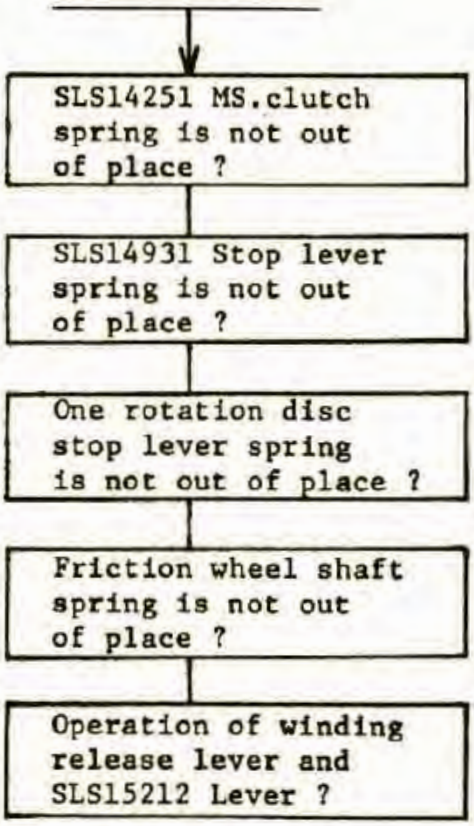
Trouble Shooting

No.4 Winding

Can not Wind Shutter

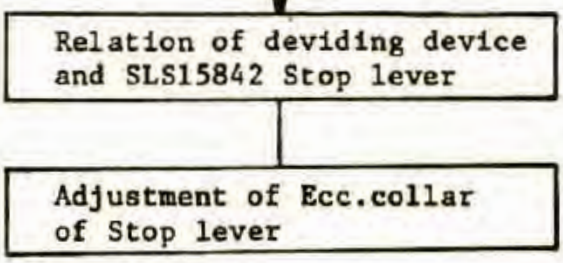

Run 2nd curtain ?
No
Battery volt 6 V ?
Operation of M C. ?
(See 8-2)
Yes
Determining and moving SLS1941T2 Mirror kick gear
(See 3-2.E)
SLS15842 Stop pawl gets out of Dividing device ?
(See 7-8)
Short, malsolder broken of SLS2064S1 printed circuit board
(See 8-4)
Operation of 2nd curtain start latch ?

Slip of Winding


SLS14251 MS.clutch spring is not out of place ?
SLS14931 Stop lever spring is not out of place ?
One rotation disc stop lever spring is not out of place ?
Friction wheel shaft spring is not out of place ?
Operation of winding release lever and SLS15212 Lever ?

After 15 exposures (30 exposures), film winding is locked

(See 7-4,7-7,7-8)



Note : Film advance would not be made by a single revolution of film advance crank or knob,but it will be made by two revolution with empty spool.

Heavy and creak Winding

- SLS14611 Winding cam strikes SLS14501 winding base plate
- Lack of oil for spool gear in roll-film insert
- Lack of Shutter curtain shafts and bearings
- Creak of each gear and rack gear
- Warp of curtain metals
- Space between Roller of the roll-film insert and SLS11241 Roller on film rail way in body is narrow ?

Note : If so,change the both SLS41411 Shaft bearing and SLS41531 Shaft bearing to new ones.

After winding, mirror rises up

- Loosening screw for SLS14201 MS.clutch disc gear
- Clearance of 2nd curtain start latch and protrusion of S.gear No.3 (See 3-2.G)
- SLS2551T1 Mirror release lever is set in crank disc

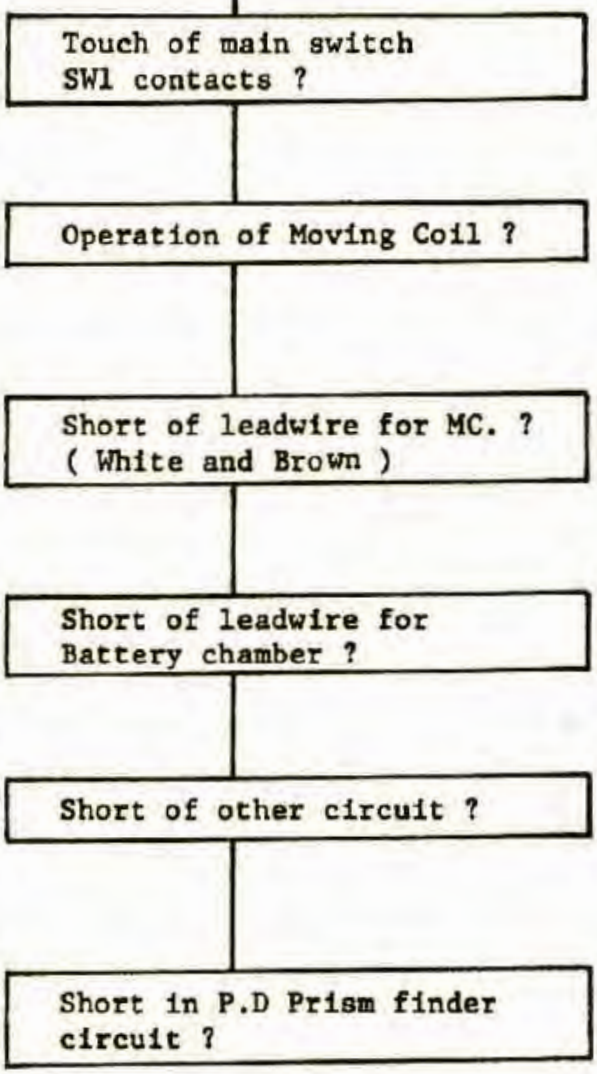
Not release by delayed Shutter release

(See 5-5)

- Operation of delayed shutter release
- Is its lever coupled with SLT23151 Coupling lever ?
- Adjustment of release stroke ?

Battery exhaustion

(See 8-4)


Touch of main switch SW1 contacts ?
Operation of Moving Coil ?
Short of leadwire for MC. ? (White and Brown)
Short of leadwire for Battery chamber ?
Short of other circuit ?
Short in P.D Prism finder circuit ?

Repair Manual
for
Mamiya M645 Camera Body

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1. Disassembly and reassembly of left and right side panel, front cover, bottom plate and F.body, M.body

1-1 Removing and attaching the film advance crank and knob

A. Removing the film advance crank

1 Rotate the film advance crank until it stops.

2 Rotate it counterclockwise approximately 20° while simultaneously pushing in on the release lever (A), and it will detach as shown in Fig. 1.

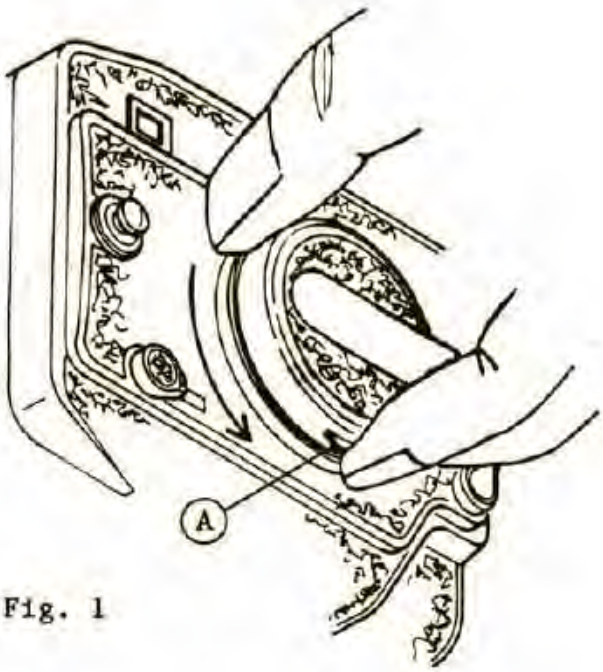


Fig. 1

B. Attaching the film advance crank

1 Align the red dot (B) of the camera body with the index line (C) on the film advance crank as shown in Fig. 2.

2 Push the film advance crank into the receptor,them twist approximately 20° clockwise while pushing in on the release lever (A),and it will lock into place.

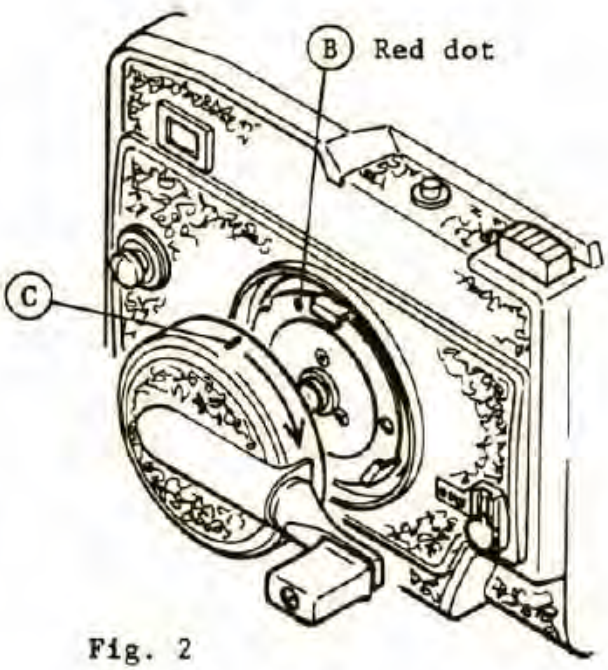


Fig. 2

C. Removing the knob

1 Rotate the film advance knob until it stops.

2 While holding the release lever Ⓓ of the knob in the UP position with a small screwdriver or suitable tool, rotate knob counterclockwise and it will disengage from camera body as shown in Fig. 3.

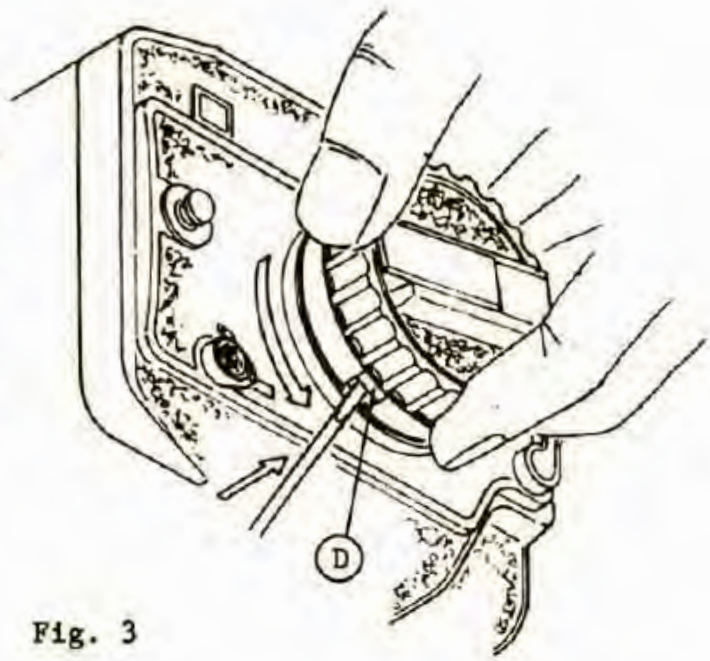


Fig. 3

D. Attaching the knob

1 Rotate the SLS14501 as for as it will go.
Then the red dot will be facing upward.

2 With the release lever Ⓓ of the knob at its lowest position, place knob against the SLS14501 Knob receptor, rotating it clockwise approximately 20° and the knob will lock into place.

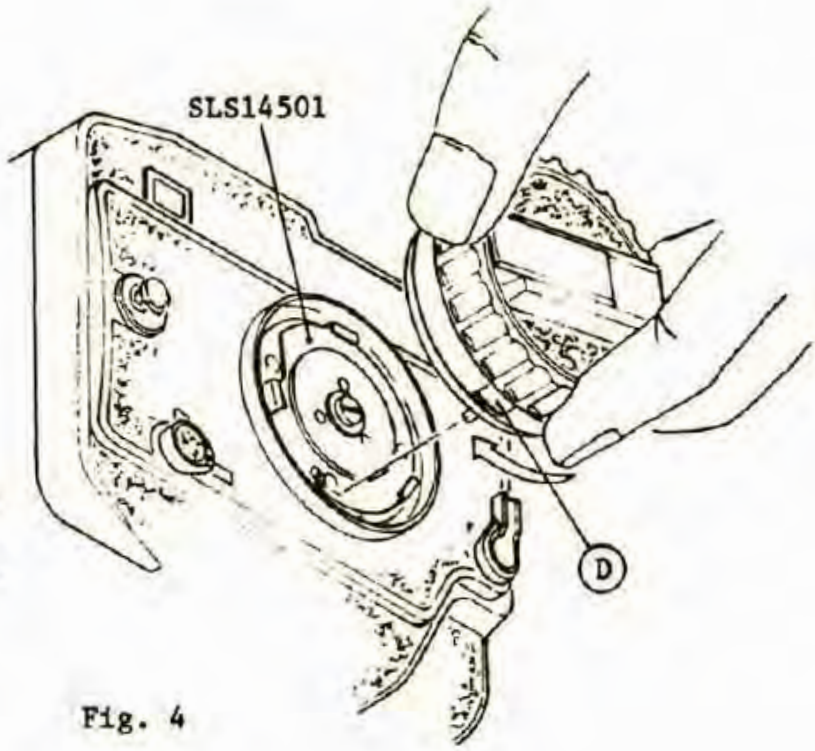


Fig. 4

1-2 Disassembly and reassembly of SLS16101 Left side panel

A. Disassembly

The arabic mumeral in a circle as shown in Fig. 5 indicates the procedure of disassembly.

Note : When removing (11) left side panel,first pull its bottom a little then push it UP.

B. Reassembly

Reassembly is normally the reverse of disassembly.

Note : When attaching the left side panel,take care that SLS 15242 DX cam is not on SLS 15432 Click lever as shown in Fig. 6.

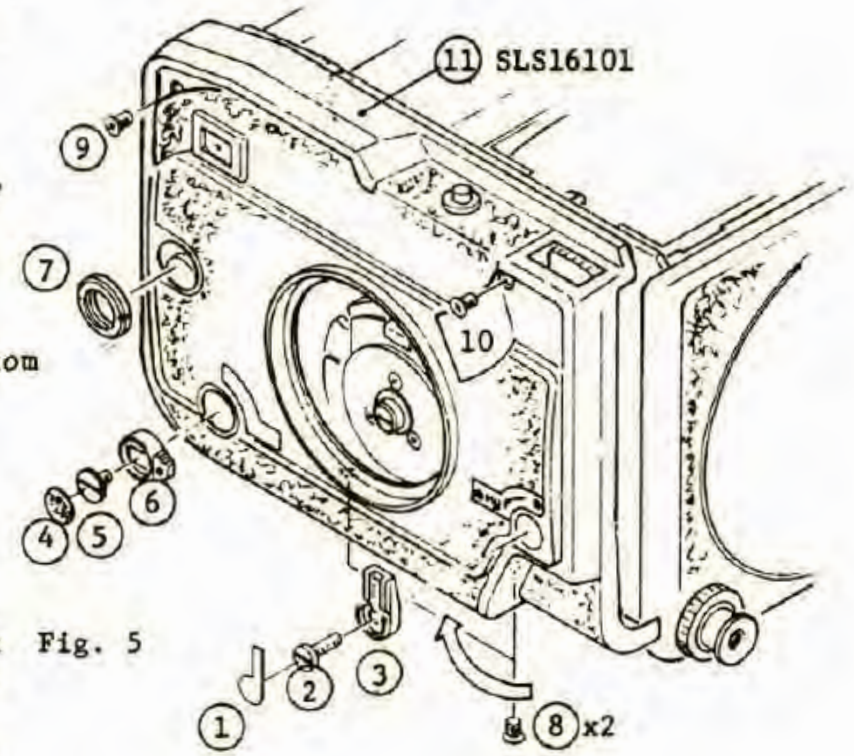


Fig. 5

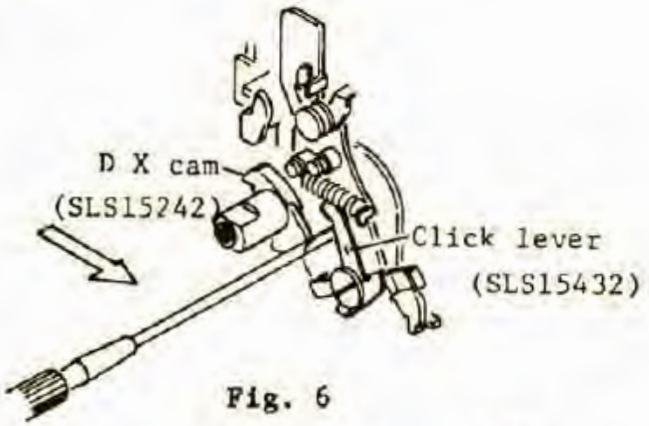


Fig. 6

1-3 Disassembly and reassembly of SLT16201 Right side panel

A. Disassembly

The arabic numeral in a circle as shown in Fig. 7 indicates the procedure of disassembly.

B Reassembly

Reassembly is normally the reverse of disassembly.

C. Disassembly and reassembly of M645 500 (SLS)

As its method is quite similar with M645 1000S except shutter dial mechanism,please refer to above step A .and B .

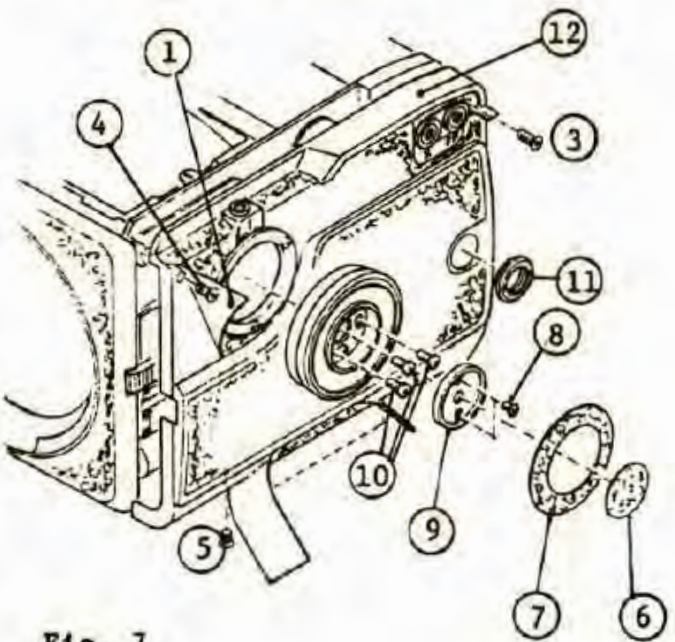


Fig. 7

1-4 Disassembly and reassembly of SLT2131T1 Front cover

A. Disassembly

The arabic numeral in a circle as shown in Fig. 8 indicates the procedure of disassembly.

B. Reassembly

Reassembly is normally the reverse of disassembly.

a. Attaching delayed shutter release lever

1) Attaching the SLT2331T1 Release lever temporarily and cock the delayed shutter release by rotating it then remove it again.

2) Attach the SLT2341T1 Activating lever in its cocked position as shown in Fig. 9.

3) Attach the SLT2331T1 Delayed shutter release lever, SLT23361 Spring and SLT23331 Disc.

4) Get the top of SLT23361 Spring through the SLT23331 Disc.

5) Tighten 3PD1.4x3BNi Screw loosely.
Wind the spring by turning the disc counterclockwise 90° and then tighten the screw steadily.

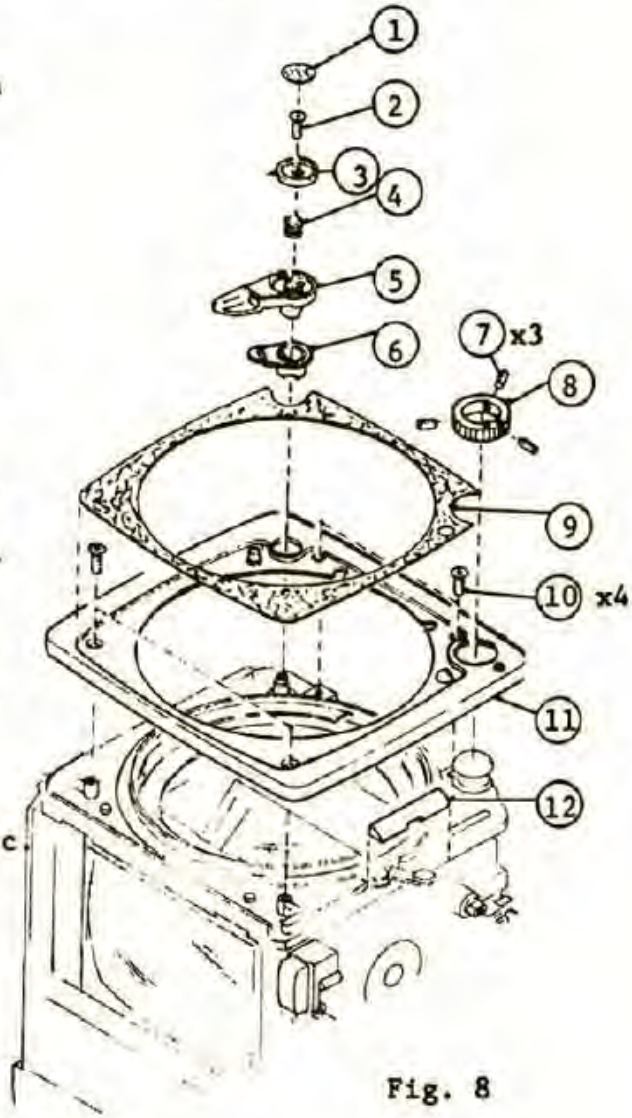


Fig. 8

C. Disassembly and reassembly of the front cover of M645 500.

M645 500 is without delayed shutter release mechanism, therefore dis-and re-assembly method is easer than M645 1000S.

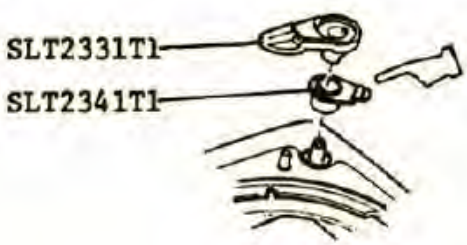


Fig. 9

1-5 Disassembly and reassembly of SLT16401 Bottom plate

A. Removal

After removing SLT29211 Leatherette, take off two PD2x5BNi and two 3PB1.7x3BNi screws. Then the bottom plate can be removed as shown in Fig. 11.

B. Reassembly

Reassembly is normally the reverse of removal.

C. Dis-and re-assembly of bottom plate of M645 500

Note : Before tightening its screws, hook end of the spring to inside of the battery chamber as shown in Fig. 10.

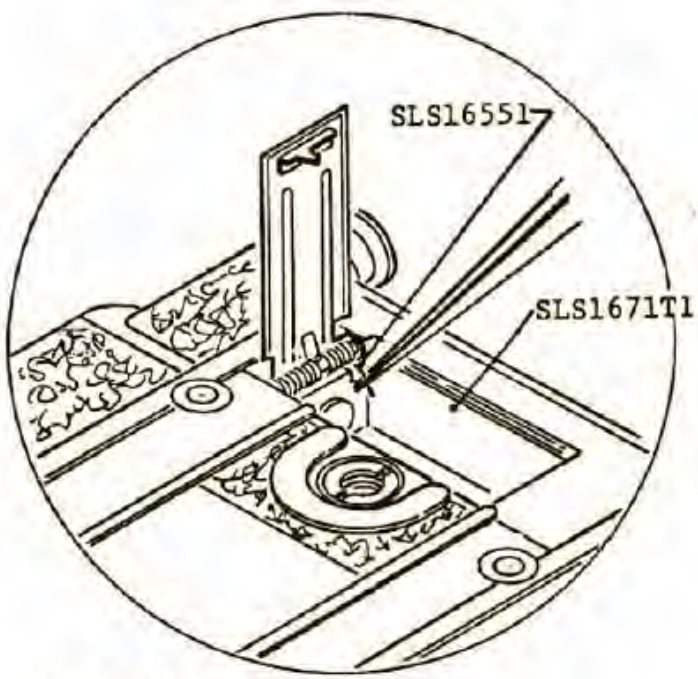


Fig. 10

1-6 Disassembly and reassembly of F.body and M.body

A. Disassembly of SLS13101 Winding base unit, F.body and M.body.

The arabic numeral in a circle as shown in Fig. 11 indicates the procedure of disassembly.

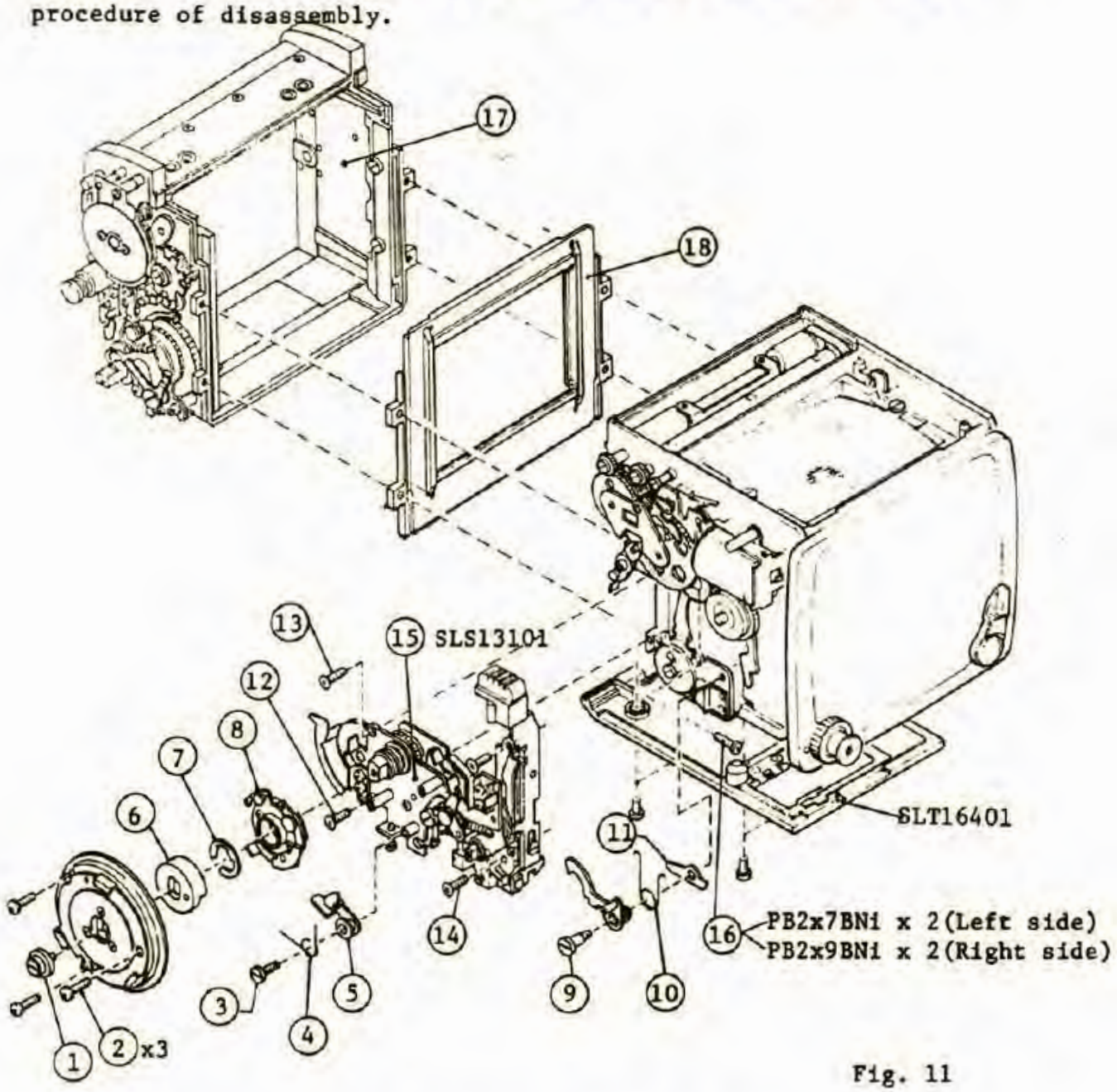


Fig. 11

Note : Before removing above,please do following points.

1) Unsolder SLS14351 Yellow leadwire to the trigger switch SW2, SLS14461 Pinc and SLS14471 Brown leadwire to FP-contact. Remove the SLS1355T1 Main switch SW1 by taking off its two screws PB1.7x4BNi.

2) Remove SLS29511 Sealing strip in bottom face.

B. Reassembly

Reassembly is normally the reverse of disassembly.

1) Install the (15) SLS13101 Winding base unit :

a. Release the shutter

b. While pushing and holding SLT21531 Release lever in direction shown by the arrow with right hand thumb, put the winding base unit on the body and hold it left hand as shown in Fig. 12.

c. When rotating the mirror lock-up lever counterclockwise 90° with tweezers or pincers, you can hear "click". Now the winding base unit will be installed into right position.

d. Tighten its four screws.

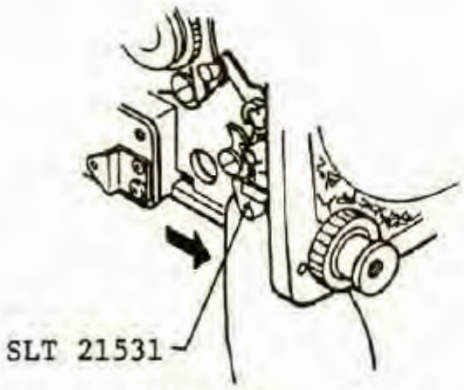


Fig. 12

2) After reassembling the F.body and M.body, the SLS29511 Sealing strip must be put to its position in bottom face without fault to prevent light leak.

2. Shutter mechanism and Mirror housing mechanism

2-1 Cocking shutter

1) When winding the film advance crank or knob, (1) MS.gear No.1 turns clockwise, simultaneously (2) MS.gear No.2 and (3) S.gear No.2 turn.

2) (3) S.gear No.2 turns (4) S.gear No.3 for 1st curtain and (5) S.gear No.1 for 2nd curtain by protrusion from its back side.

3) When (4) S.gear No.1 and (5) S.gear No.3 which are engaged with gears of 1st and 2nd curtain shafts rotate, both 1st and 2nd curtains are wound.

4) First the 1st curtain is set by (6) 1st curtain start latch and in succession the 2nd curtain is set by (7) 2nd curtain start latch.

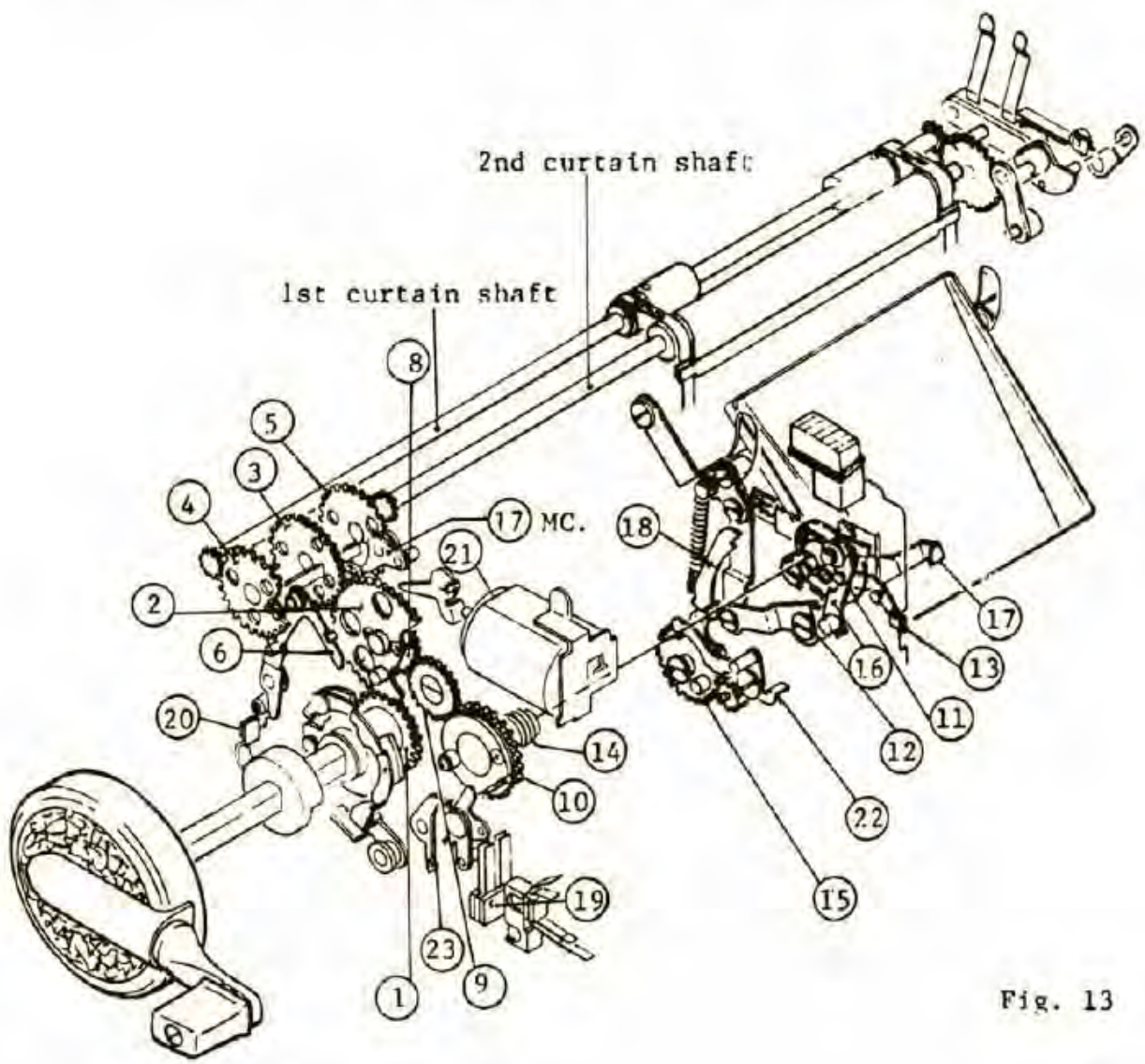


Fig. 13

2-2 Charge of mirror drive spring

1) When (1) MS.gear No.1 turning, simultaneously (8) M1.gear and (9) M2.gear turn and then (10) M3.gear is turned.

The (10) M3.gear and (11) mirror raising crank is in one unit. With the (10) and (11) turned, (12) mirror raising lever and (13) mirror release lever are set.
At this time (14) mirror drive spring is fully wound.

2) (15) M.kick gear is also charged by 2nd curtain spring shaft gear.

2-3 When pushing down shutter release button

1) With the (13) mirror release lever released, the (10) M3.gear and (11) Mirror raising crank are turned clockwise by the (14) mirror spring.

2) Mirror goes up by (12) mirror raising lever is kicked with kick lever.

3) At starting of mirror raising up, (8) aperture relay lever is pressed down and aperture mechanism in lens operates.

4) (18) mirror raising lock holds the mirror to its raised position.

5) When running the (10) M3.gear, (19) SW1 main switch is switched on by the pin on the (10) M3.gear.

6) Also (9) M2.gear and (8) M1.gear run.
(2) MS.gear turns clockwise and then the pin of the (2) MS.gear releases (6) 1st curtain start latch.
(4) S.charge gear No.3 turns and the 1st curtain starts running.

7) Simultaneously (20) SW2 trigger switch is off.

Release the (7) 2nd curtain start latch by the moving coil operating.
Then the 2nd curtain runs.

8) At the same time, the (15) mirror kick gear is turned clockwise.

When the 2nd curtain closing, the mirror is returned to it position by setting off the (18) mirror raising lock with the pin of (15) mirror kick gear.
At this time (19) SW1 main switch is off by pushing (23) SLT13811 Hook with (22) braking lever.

2-4 Winding mechanism

A. Stop mechanism

1) Insert a roll of film in the roll-film insert and place it into camera body.

2) Align the multipule-exposure lever with the white dot.

3) When winding up film advance crank or knob, top of SLS15842 Stop lever goes into a hollow of SLS1541T1.
And then moves (A) lever in direction shown by the arrow in Fig. 14.

4) When the (A) lever moving in direction → (2) → (3), (B) stopper gets in cam of SLS 14131 (A) rotation stop disc.
Then film advance crank or knob does not wind any more.

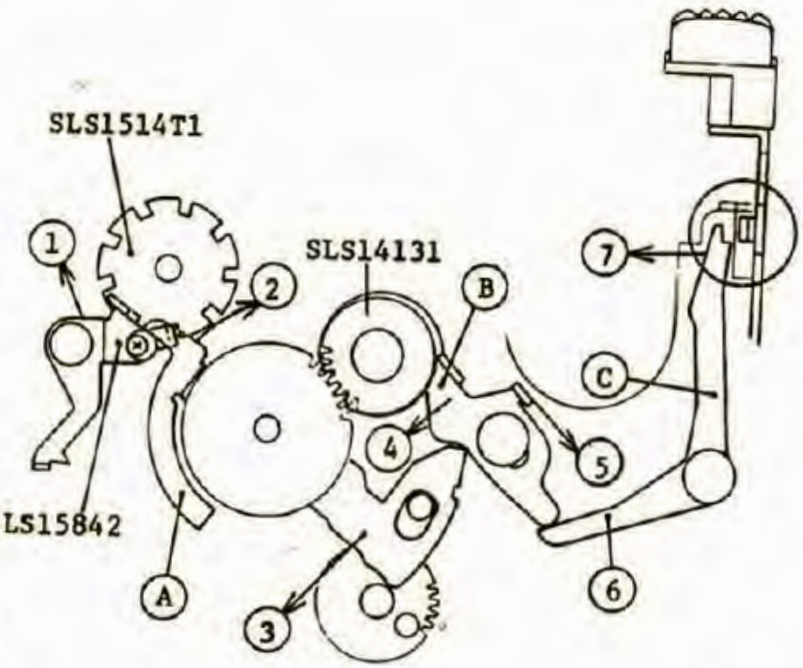


Fig. 14

B. Release of shutter release lock

1) When winding up more than above step A-4), the (B) stop lever is pushed down by the cam of SLS 14131 (A) rotation stop disc.

2) (C) Shutter release stop lever is moved in direction → (6) → (7) by being pushed with tail of the (B) stopper.
Then the shutter release lock becomes free.

C. Unlock of winding

1) When the 2nd curtain closing, the pin of SLS1941T2 Mirror kick gear kicks (A).

2) The (A) pushes the (B) stopper out of the cam of SLS14131 (A) rotation stop disc.
Then winding is possible.

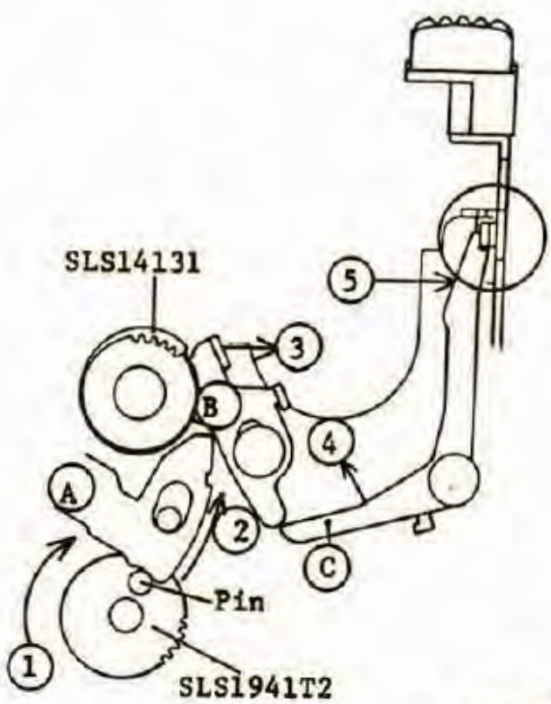


Fig. 15

D. Lock of shutter release

Getting out of the SLS14131 A rotation stop disc, the (B) stopper goes up.
Continuously the (C) shutter release stop lever moves in direction → (4) → (5).
Then shutter release button is locked.

2-5 Mirror Lock-UP mechanism

To lock the mirror up, merely move the mirror lock-up lever backwards, until it is horizontal.

Note : The lever may be lowered either before or after cocking the shutter.

Pressing the shutter button in this condition, only shutter runs. With the film advance crank or knob wound, the shutter is cocked and film is advanced.

A. Mirror-UP

The arabic numeral in a circle as shown in Fig. 16-1 indicates operation of the mirror up.

B. Release of Mirror UP

When return the mirror lock-up lever, SLS2471T1 Mirror arm returns, simultaneously (A) turns clockwise and continuously [2], [3], [4] and [5] operate as shown in Fig 16-2.
Then return the mirror to its normal position.

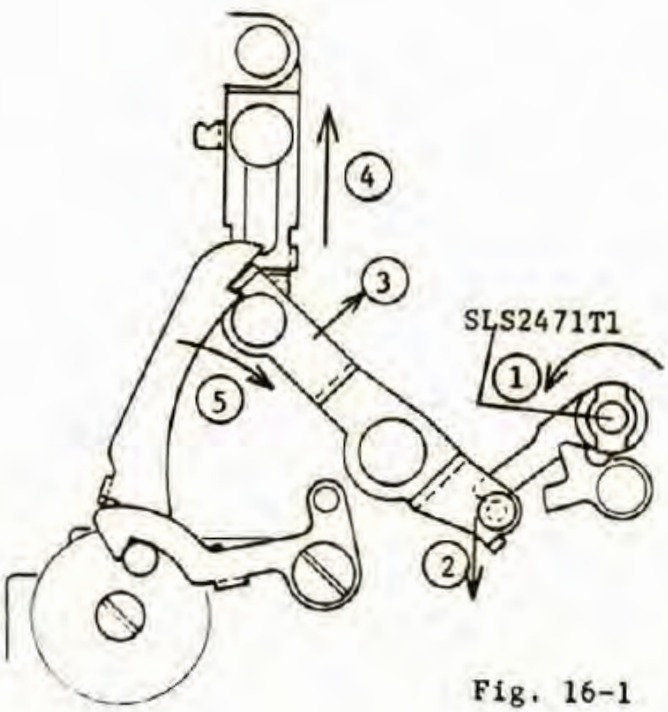


Fig. 16-1

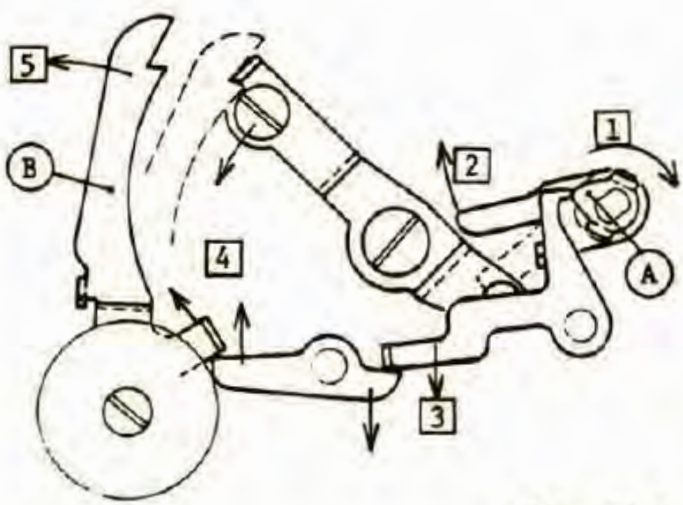


Fig. 16-2

C. Replacement of mirror

1) Removal

Remove SLS24151 Retaining spring by taking off two PB1.4x1.8BNi screws as refering to the parts catalog page 4.
Then the mirror can be removed.

2) Attaching

Attach the mirror carefully not to put your fingerprints and scratches on it.
After that check mirror angle 45° by refering to 6-2.

3. Disassembly and Reassembly of shutter curtain

3-1 Disassembly

The arabic numeral in a circle as shown in Fig. 18 indicates the procedure of disassembly.

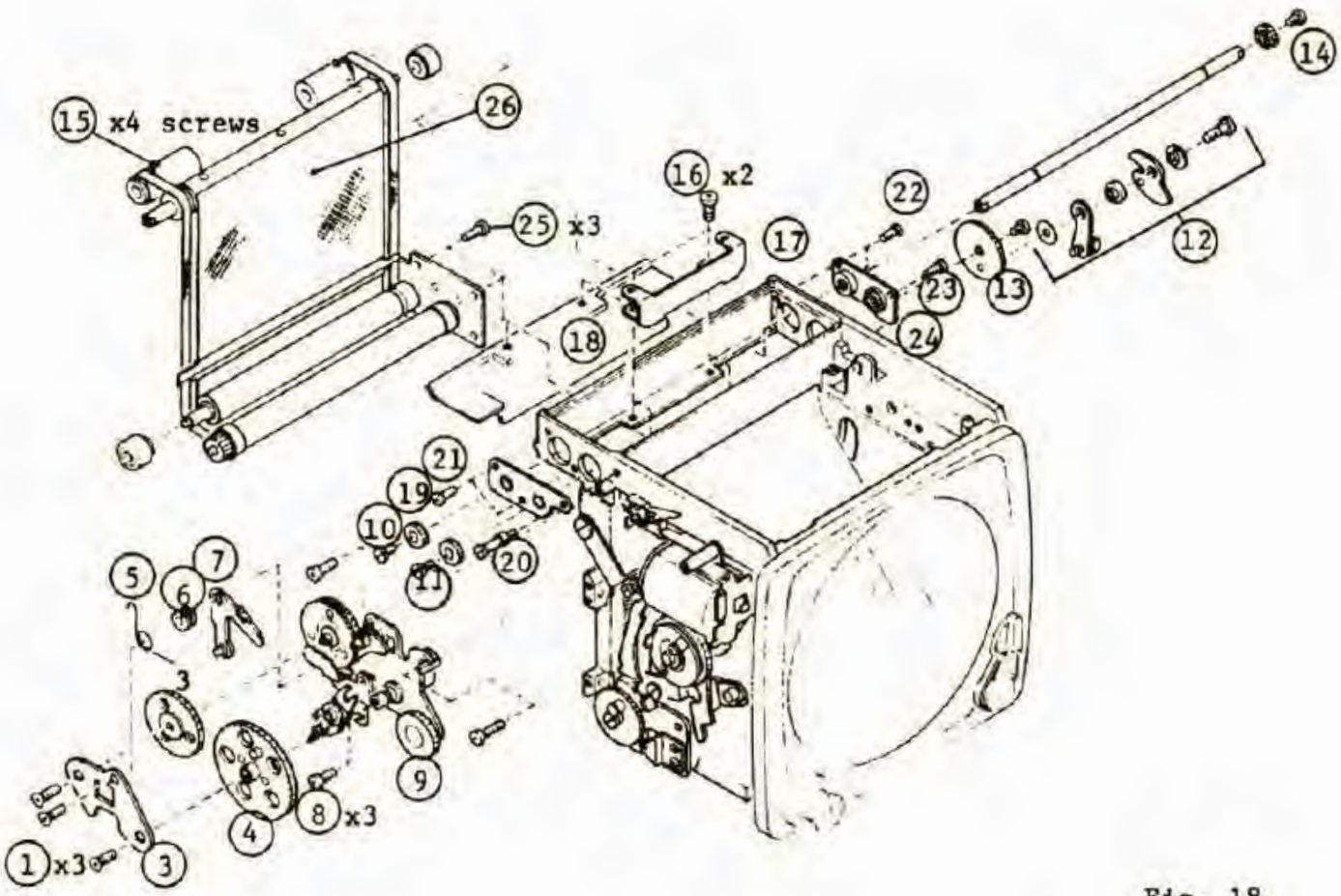


Fig. 18

3-2 Assembly of shutter curtain unit

A. Installing the shutter curtain unit into the M.body

1) Put the curtain unit in order as shown in Fig. 19.
First install part-(A) of the curtain unit to the M.body and then part-(B).
Tighten three screws PB1.7x3BNi.

2) After installing the part-(A) and (B), 1st and 2nd curtain spring drums, get the 1st curtain out of the 2nd curtain by passing 1st curtain metal and its ribbons through the 2nd curtain as shown in Fig. 20-1.

3) Check thrust play of 2nd curtain spring drum.

When 2nd curtain spring drum does not move smoothly, raise up end of SLS19381 Bracket a little as shown in Fig. 20-2.

Note : Must not make its thrust play much.

4) Embrace ribbons of 1st curtain inside of 2nd curtain shaft (C) and then attach the 2nd curtain shaft (C) to the body.

5) Attach SLS1841T1 Bearing plate with three screws PB1.7x2.5BNi.

6) Set a washer to opposite side of the shaft and attach SLS1831T1 Bearing plate with an anchor and two screws PB1.7x2.5BNi.

7) Put twist of 1st curtain ribbon in order. Insert SLS18151 Shaft into hole of the M.body and then set SLS18161 Ribbon pipes.

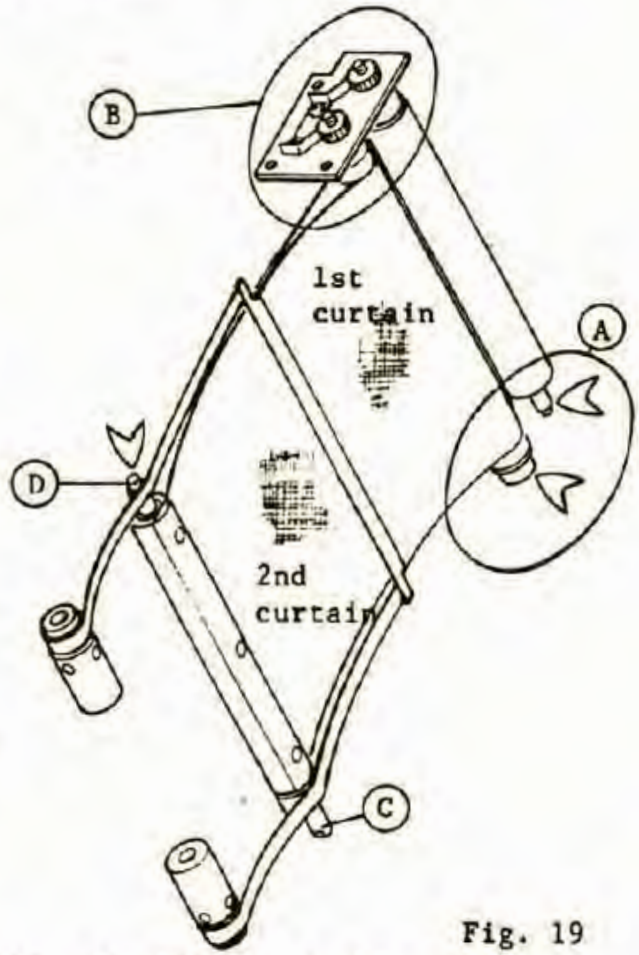


Fig. 19

Fig. 19 ≪Apply Moebius oil.

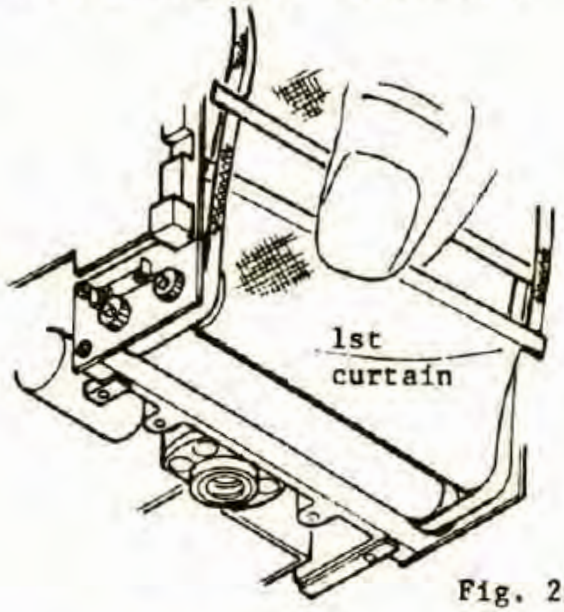
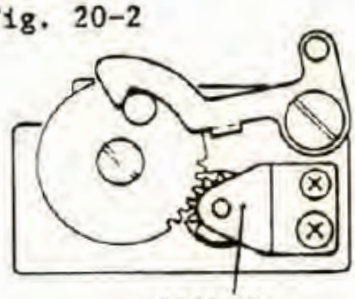


Fig. 20-1

Fig. 20-2



8) Tighten a SLS18172 Set screw to one of the ribbon pipes as shown in Fig. 21.

Note : The set screw must be tightened into groove of the shaft as shown in Fig. 22

9) Rotate the shaft 180° (one half) and tighten second SLS18172 Set screw into oppsite side hole of the first one.

10) Set the other ribbon pipe as same method with first one.

Note : Take care that the curtain metal should be in parallel.

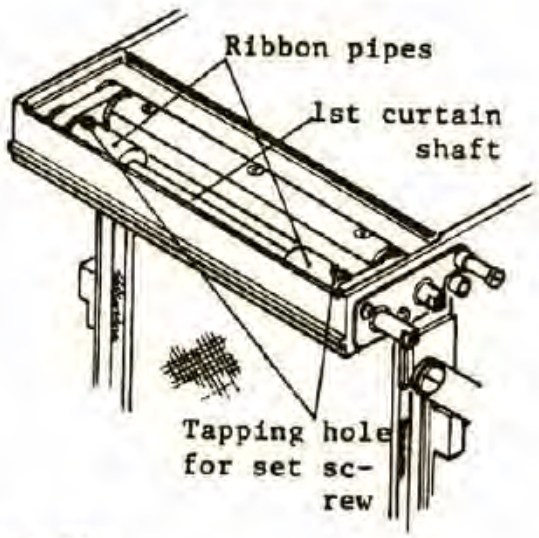


Fig. 21

B. Check and adjustment of parallel of 1st curtain metal.

1) Check

Wind 2nd curtain until a half of film format.
Check the parallel of 1st curtain metal with bottom line of the film format.

2) Adjustment

Adjustment is made by resetting the ribbon pipe.

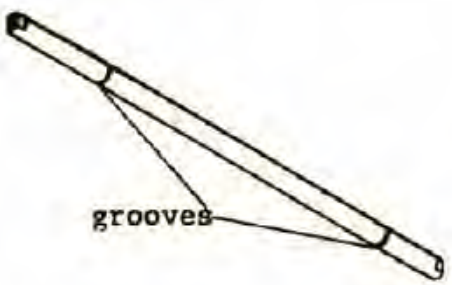


Fig. 22

C. Determining 2nd curtain

1) Attach SLS18371 Gear to end of 1st curtain shaft in right side.
After appling plyo-bond into tapping hole of the shaft, tighten the SLS18381 Screw.

2)

	Turn clockwise
1st curtain spring shaft	Four full turns
2nd curtain spring shaft	Two full turns

Fig. 23

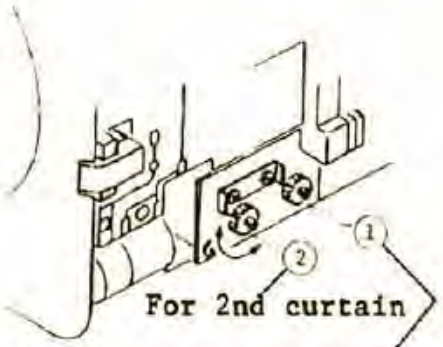


Fig. 23

3) Install SLT17101 Base plate and SLS 17451 Spring as shown in Fig. 18.

4) Rotate the 1731T1 S.gear No.1 counterclockwise until it stops.

5) Rotate 2nd curtain shaft with the index finger and middle finger of left hand counterclockwise, until its cut end points 11 Oclock (inclines at thirty degrees) as shown in Fig. 24.

6) Attach SLS18371 Gear by facing its protrusion side upward to the 2nd curtain shaft.
Simultaneously engage it with the SLS1731T1 S.gear No.1.

7) Cock the 2nd curtain only by rotating its shaft with the index and middle finger.

8) 2nd curtain position when cocking it up fully:

a. Bottom line of 2nd curtain metal should be on three dots as shown in Fig. 25.

b. When 2nd curtain is in proper position, apply the Plyo-bond into tapping hole of the 2nd curtain shaft and tighten SLS18381 Screw.

9) Adjustment

When position of 2nd curtain metal is out of the limit, adjust it by changing mesh of the SLS18371 Gear with SLS1731T1 S.gear No.1.

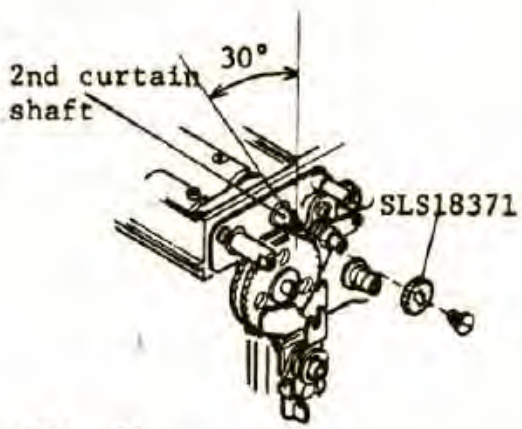


Fig. 24

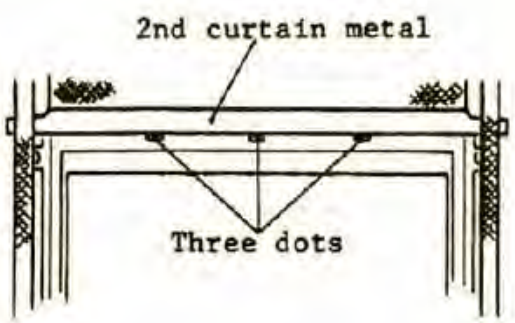


Fig. 25

D. Adjusting parallel of 2nd curtain

1) Parallel with 2nd curtain wound.

a. Cut some black color Binyl-tape in same width with curtain ribbon.

b. Rotate the 2nd curtain spring drum with left hand index finger and middle finger counterclockwise about one rotation. Both ribbons will become loose as shown in Fig. 26.

c. Put the adequate length of Binyl-tape between the ribbons which it would be necessary to amend.

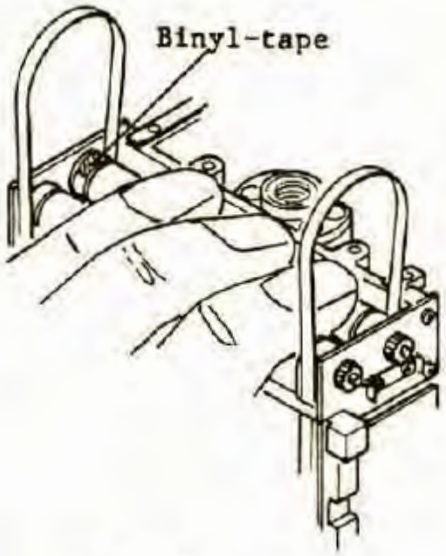


Fig. 26

2) Parallel with 2nd curtain released :

a. Wind the 2nd curtain until the curtain metal goes over bottom line of the film format by rotating the 2nd curtain spring drum.

Check the parallel of the curtain metal with the bottom line of the film format.

b. Adjustment

1. Cock the 2nd curtain by rotating the 2nd curtain spring drum.

2. Put the adequate length of Binyl-tape on the ribbon, if it would be required as shown in Fig. 27.

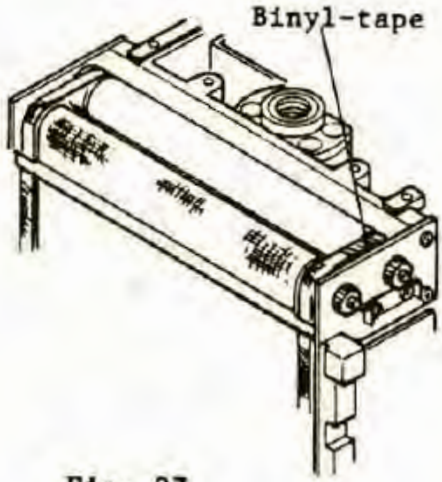


Fig. 27

E. Installing SLS1941T2 Mirror kick gear

1) Release the shutter

2) Apply Moebius oil to shaft of gear and pin on gear.

3) Temporarily attach SLS1944T2 Brake lever to its position and then install the gear as shown in Fig. 28.
Tighten its screw SLS21721.

4) The gear should rotate smoothly.
If not, adjust it by SLS19381 Bracket as shown in Fig. 28.

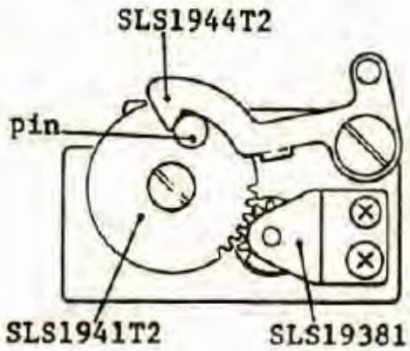


Fig. 28

F. Determining SLS1721T1 MS.gear NO.2

1) Release shutter

2) Rotate the SLS1735T1 Gear No.2 as center of protrusion (A) is on the line (B) as shown in Fig. 29

3) Engage SLS1721T1 MS.gear No.2 with SLS1735T1 S.gear No.2 as making a right angle at the center of pin (C) between line $\overline{D\ C}$ and $\overline{E\ C}$ as shown in Fig. 29.

4) For being the angle 90° degrees, change mesh of the SLS1735T1 S.gear No.2.

Allowable limit of changing mesh shown in Fig. 30.
Left side of the protrusion (A) should be in ± 0.3mm from the line (B).

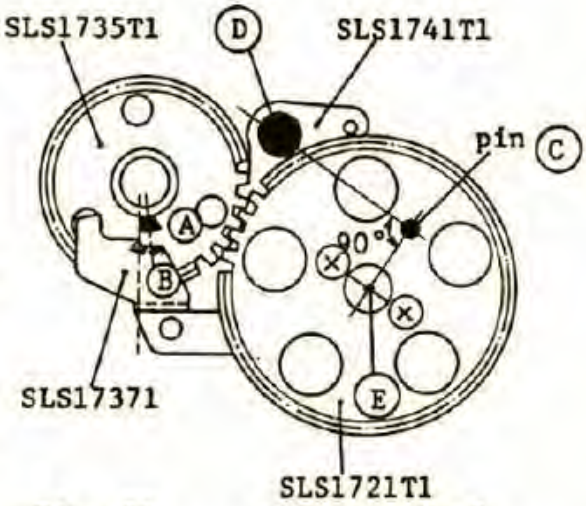


Fig. 29

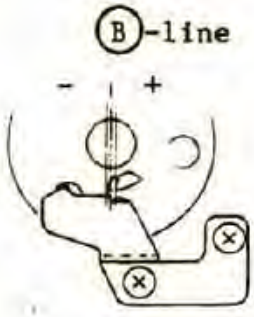


Fig. 30

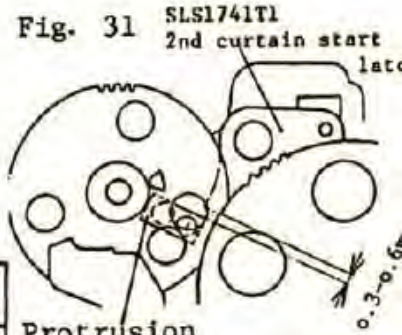
G. Clearance of 2nd curtain start latch and protrusion of S.gear No.1:

1) Check

a. Cock the shutter by turning SLS2511T2 Mirror raising crank gear counterclockwise.

b. Check clearance between the SLS1741T1 2nd curtain start latch and the protrusion of SLS1731T1 S.gear No.1 by looking through hole of SLS1735T1 S.gear No.2 as shown in Fig. 31.

Fig. 31



2) Adjustment

a. Adjustment should be made by changing mesh of the SLS1735T1 S.gear No.2.

Clearance	Change mesh
Less than 0.3mm	One tooth clockwise
Over 0.6mm	One tooth counterclockwise

b. Fine adjustment

Normally adjustment in made by step "a", however fine adjustment can be done by turning SLS25532 Eccentric collar as shown in Fig. 32.

After adjusting apply screw Lock-tight around the collar.

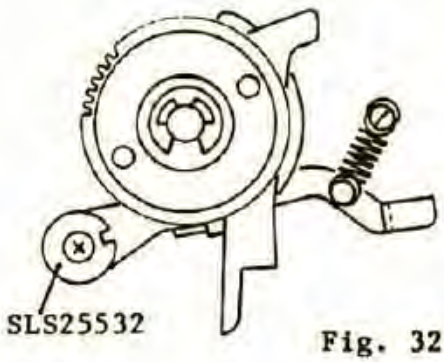


Fig. 32

H. Installation of S.charge gear NO.3

1) Attach the SLS18371 Gear to the 1st curtain shaft by facing the Protrusion side of it downward.

2) Apply Plyo-bond into tapping hole of the shaft and tighten the SLS18381 Screw.

3) Release the shutter

4) Wind the 1st curtain by rotating 1st curtain shaft with index and middle finger until the 1st curtain metal overlaps on the 2nd curtain metal at about its half width as shown in Fig. 33.

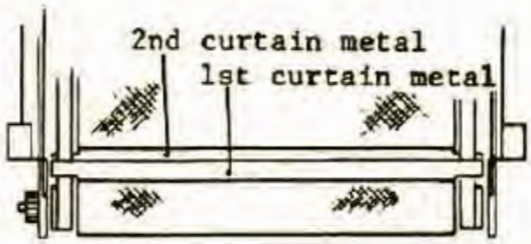


Fig. 33

5) In keeping above step 4), engage SLS1731T1 S.charge gear No.3 with the 1st curtain shaft gear. But the protrusion on reverse side of it should be in touch with SLS 17371 Stopper as shown in Fig. 34.

6) Install the SLS1751T2 1st curtain start latch.

7) Install the SLS17532 Ecc.collar by facing its notch upward.

8) Set the SLS17551 Spring.

9) Link the pin of the SLS1751T2 1st curtain start latch with the SLS 17661 Trigger switch lever.

10) Place the SLS17751 Fixing base and tighten it three screws and apply lock tight on them.

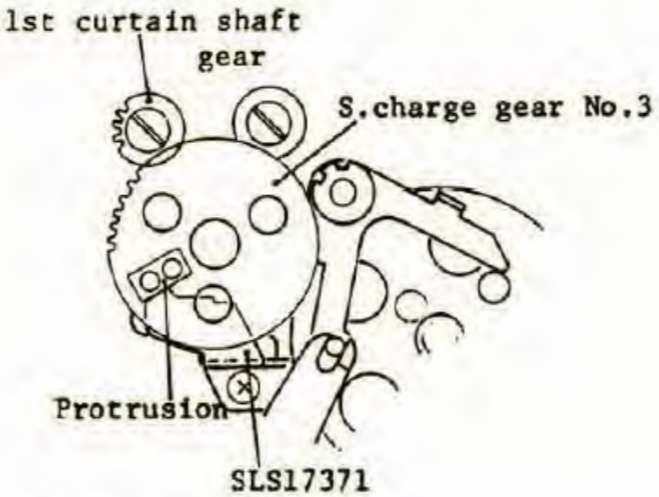


Fig. 34

11) Recheck

Wind the shutter slowly and check as follows.

a. First the 1st curtain satrt latch should be set with sound "click".

b. Next the 2nd curtain start latch should be set.

c. Finally the SLS2551T1 Mirror release crank lever should be set.

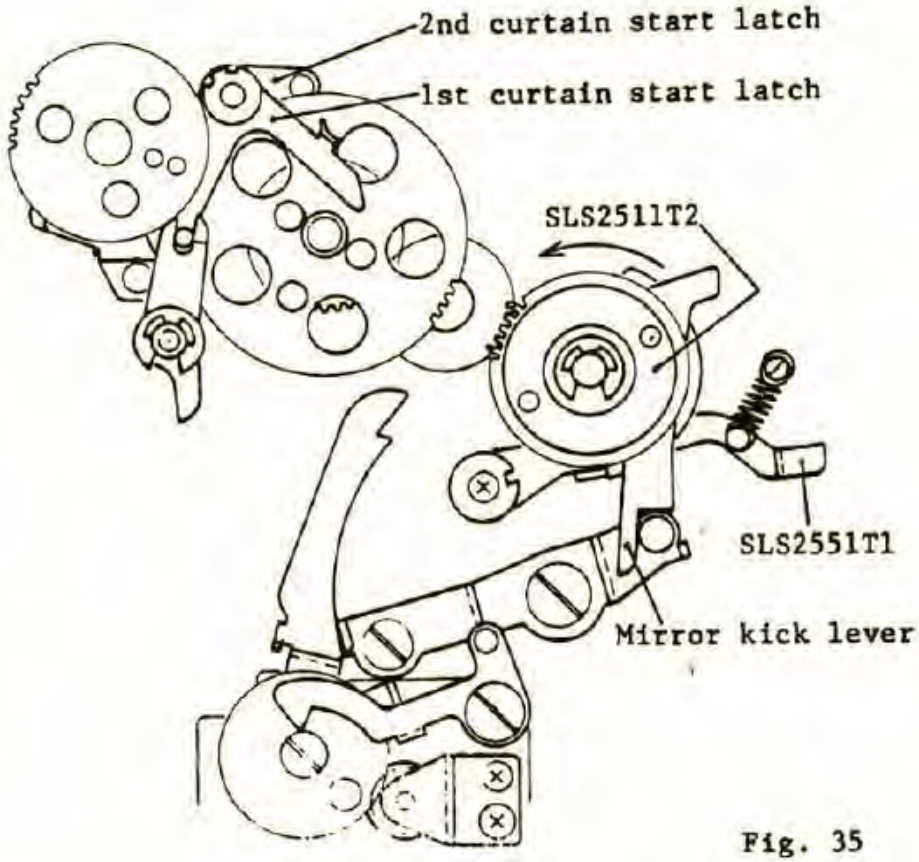


Fig. 35

With the SLS2511T2 Mirror raising crank counterclockwise wound, 1st and 2nd curtains are cocked as well as the mirror drive spring.

When releasing the SLS2551T1 Mirror release lever and then the Mirror kick lever,
the mirror drive spring and 1st curtain run.

When releasing the 2nd curtain start latch,
the 2nd curtain runs.

I. Determining 1st curtain :

Cock the shutter and then release only the SLS2551T1 Mirror release lever.
Consequently, 1st and 2nd curtain metals should be come down slightly.

1) Check

a. In above case width of both curtain metals should be 4.4mm to 4.8mm at each side as shown in Fig. 36.

b. Release only the 1st curtain and cheack the parallel of 1st curtain metal with bottom line of the film format.

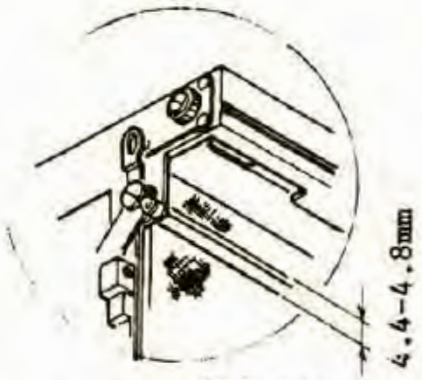


Fig. 36

2) Adjustment

a. Adjustment for above step "a" and "b" is made by resetting the ribbon pipes.

b. As the parallel of 1st curtain metal at its released position is OK, but, in Fig. 36 its parallel is no good.

In such condition, adjustment is made as follows:
Release the 1st curtain and put an adequate length of Binyl-tape on the ribbon, if it would be required as shown in Fig. 37.

c. After adjusting, apply the screw lock.

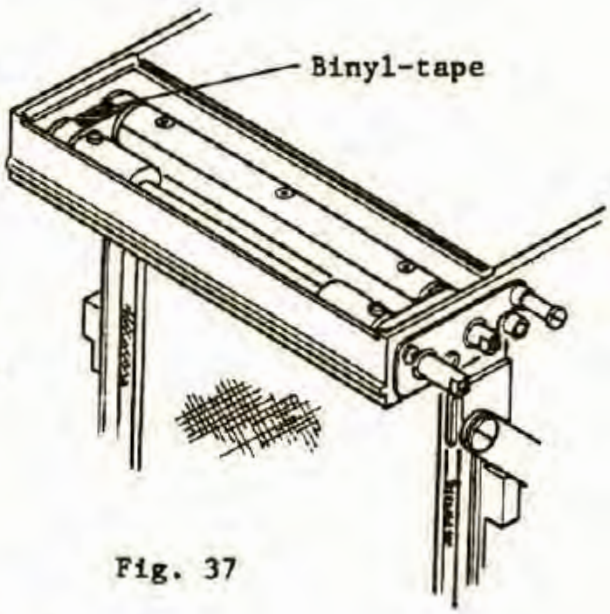


Fig. 37

J. Installing SLS19611 Ornament cover and SLS19662 Bracket.

Install the ornament cover by pulling it to outside fully.
When inserting the SLS11211 Guide rail plate, the ornament cover must not disturb the guide rail plate.

K. Assembly of F.body , M.body, Winding base unit Bottom plate and etc.

Please do them by refering to 1-5 and 1-6, as well as soldering lead wires.

L. Replacement of only 2nd curtain

The 2nd curtain unit can be changed without disassembling M.body, F.body and SLT17101 Charging base.

If the 2nd curtain unit is changed without removing the 1st and 2nd curtains complete unit, the new 2nd curtain must be install in exactly the same position as the old ones, (because overlap and start position of the 2nd curtain can not be adjusted.)

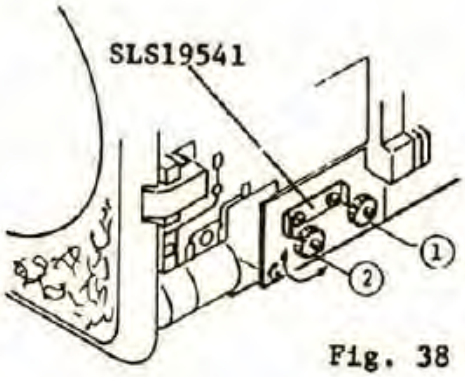


Fig. 38

1) Removing 2nd curtain unit:

a. Release the shutter

b. Release SLS19541 Stop spring (2) on the gear of 2nd curtain spring drum by tweezers as shown in Fig. 38.

c. Loosen three PD1.7x6BNi screws for SLT18291 Curtain fastener as shown in Fig.39.

d. Pull out the curtain from the SLT 18261 2nd curtain drum.

e. Strip the both ribbon from the SLS19231 2nd curtain spring drum.

f. Remove the 2nd curtain by pulling it upward.

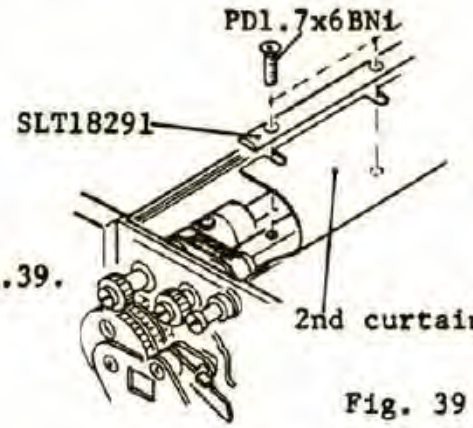


Fig. 39

2) Installation of 2nd curtain

a. Installing a new curtain in exactly the same position as the old ones, draw a line on reverse side of new curtain by pencil as A=A' shown in Fig. 40.

b. Insert the both ribbon from top of the body.

c. Install the curtain on the drum and tighten the 3 screws.

d. Cock the 2nd curtain.

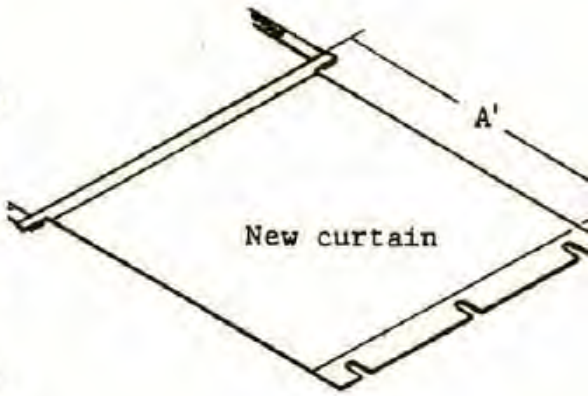
e. Put the both ribbon to the 2nd curtain spring drum with Plyo-bond.

Note : 1. Put the both ribbon as being parallel.

2. Apply the Plyo-bond to the ribbon until one and half turns.

f. Rotate the 2nd curtain spring shaft clockwise two turns fully.

g. For the parallel of the 2nd curtain, refer to 3-2 D.



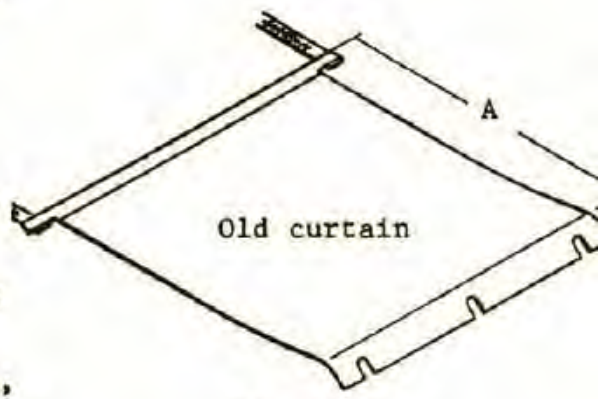


Fig. 40

4. 1st curtain brake, position of MS.clutch and timing when the MS.clutch is detached.

4-1 Installing X.synchro. gear and 1st curtain brake

A. Installing X.synchro. gear :

1) Cocking the shutter.

2) As align the center of pin (A) on the line $\overline{B\ C}$ or put the (A) one tooth upward from the line $\overline{B\ C}$, engage the X.synchro. gear with the 1st curtain gear.
And SLS15371 Screw as shown in Fig. 41.

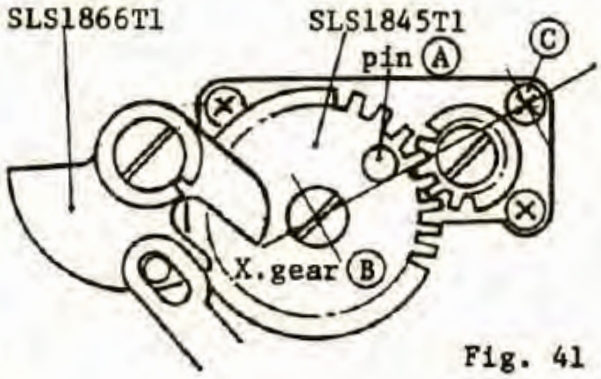


Fig. 41

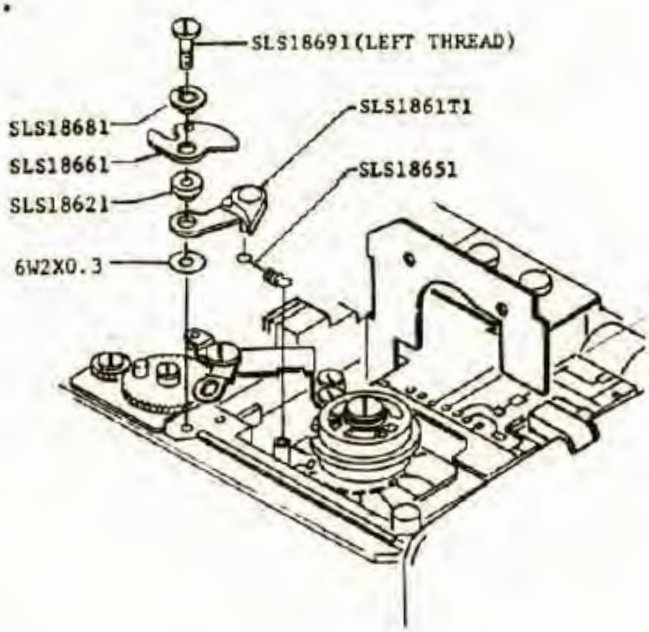
B. Installing 1st curtain brake :

1) Install relative parts for brakes as shown in Fig. 42.

2) Put the SLS18681 Eccentric collar by facing its notch downward.

3) Never forget to set the SLS18651 Spring.

4) Apply Moebuis oil to (A) parts and EP grease or Hericolube to (B) parts as shown in Fig. 43.



4-2 Installing SLS14201 MS.clutch disc

1) Release the shutter.

2) Turn the SLS1721T1 MS. gear No.2 clockwise until it stops.

3) As align the center of (A) pin on the line $\overline{B\ C}$ or put it one tooth upward, engage the SLS14201 MS. clutch disc gear with the SLS 1721T1 MS.gear No.2.

4) Attach the C-8 C-ring.

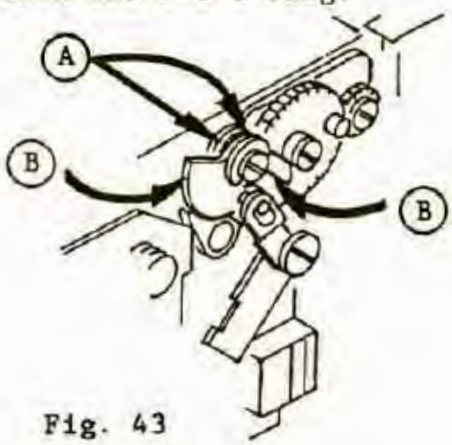


Fig. 43

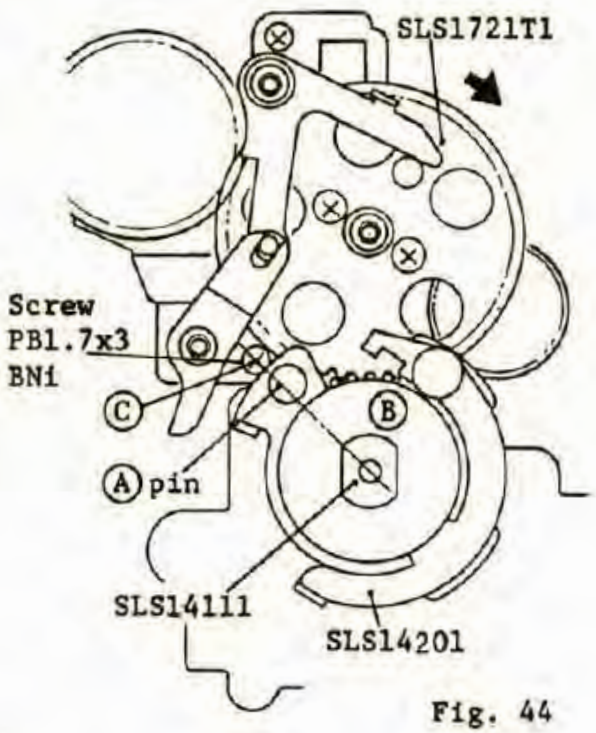


Fig. 44

4-3 Timing when the SLS14201 MS.clutch is detached

A. Adjustment :

1) Attach SLS-18 Winding tool and wind slowly.

2) As it has been explained at Fig. 35, first the 1st curtain start latch should be set with sound "click" and then the 2nd curtain start latch.

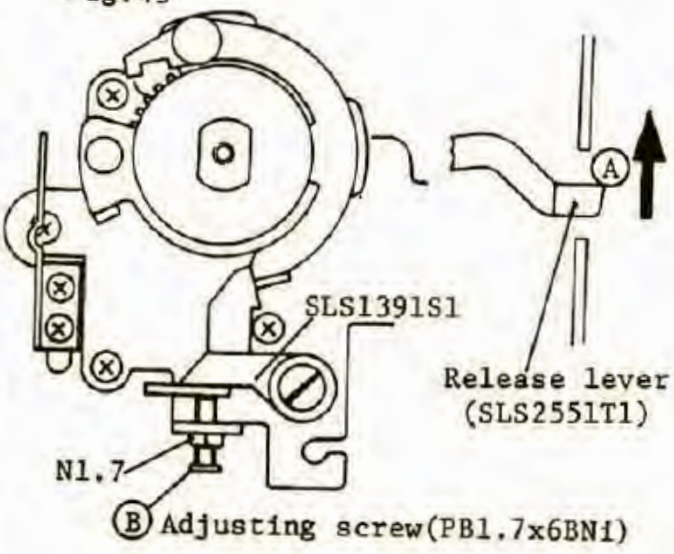
3) Finally when the SLS2551T1 Mirror release lever is set, its lever will move up slightly as shown in Fig. 45. 46. 47.

Note : If you observe it carefully, you can see its movement through space of body.

4) When the lever (A) moving up, stop winding at once and keep the film advance crank at stopped position, without winding fully or return.

5) Loosen the N1.7 Nut and then screw in the PB1.7x6BNi adjusting screw (B) until it touches with the SLS1391S1 Clutch stopper.

Fig.45



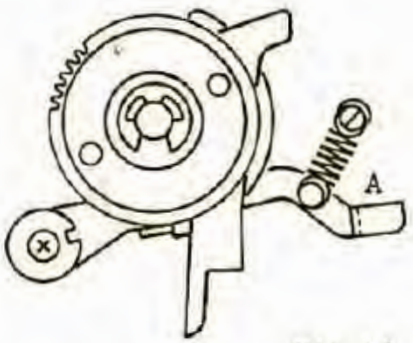


Fig.46

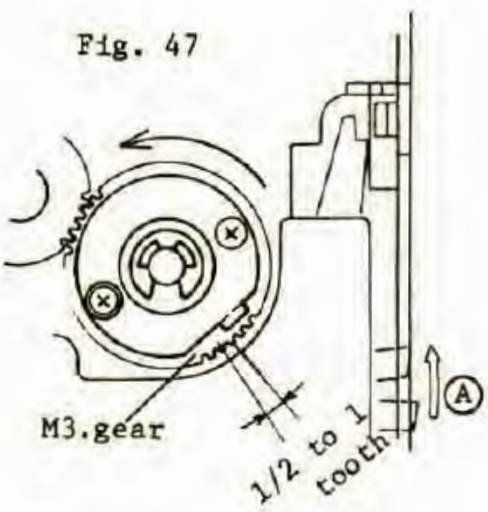
B. Check

1) Wind the shutter quietly and slowly. Stop the winding as soon as the release lever is set and keep the film advance crank at stopped position.

2) When winding up it slowly again from stopped position, the SLS14201 MS. clutch should be detached from the SLS14611 Winding cam after a half tooth or one tooth of M3.gear moved more as shown in Fig. 47.

3) Tighten the N1.7 Nut and apply plyobond around the nut.

Fig. 47



4-4 Check and adjustment of 1st curtain bounce

A. Adjusting curtain travel time :

Standard travel time : 12ms to 12.5ms

1) Put the one 6V silver-oxide battery into camera body.

2) Set the shutter speed dial to 1/1000 (SLS 1/500)

3) Adjust the curtain travel time with the shutter tester.

4) Adjustment :

Adjustment is made by turning the 1st and 2nd curtain spring drum shafts as shown in Fig. 48.

Turn it clockwise.....fast

Turn it counterclockwise....slow

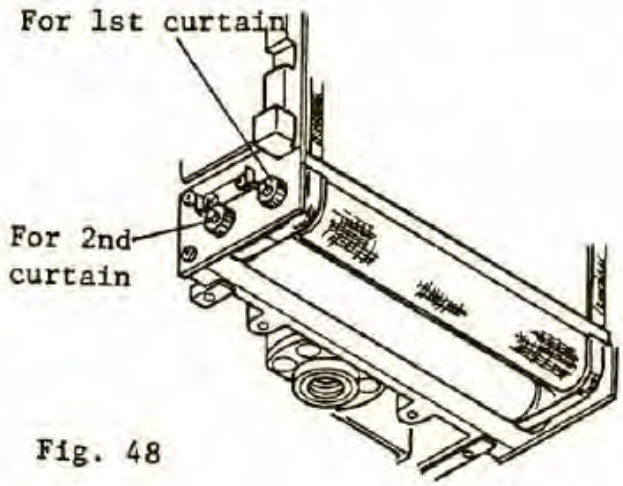


Fig. 48

Note : 1. With the SLS19561 Gear in two teeth turned, the curtain travel time would be changed 0.1ms.

2. 1st curtain travel time should not be slower than 2nd curtain and the difference between both curtain travel time should be within 0.1ms.

B. Check and adjustment of 1st curtain bounce.

1) Check:

a. Set the shutter speed dial to 1/1000 (SLS 1/500).

b. After releasing the shutter several time, check it with the shutter tester.

2) Adjustment :

Adjustment is made by turning the SLS18681 Ecc.collar counterclockwise as shown in Fig. 49.

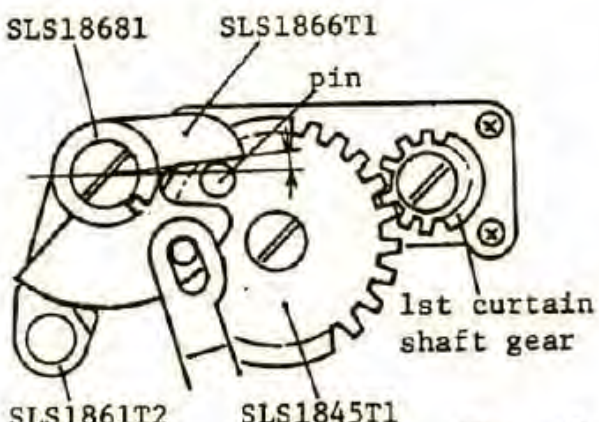


Fig. 49

3) Check 1st curtain does not stay in the film format.

a. Release the shutter speed at 1/1000(SLS1/500) and B alternately.

b. The 1st curtain metal must not remain in the film format as shown in Fig. 50.

Shutter speed	Remainder of the metal	Braking	Turn Ecc. collar
1/1000 or 1/500	Yes	Weaker	
B	Yes	Stronger	

4) Adjust the 1st curtain bounce by doing above step 2) and 3) repeatedly.

5) Check moving the pin of SLS1845T1 X.synchro gear:

After releasing the shutter, try to turn the 1st curtain shaft gear counterclockwise.

At this time the pin must not get out of the brake.

Note : If it get out, readjust the bounce by changing engagement of the gears.

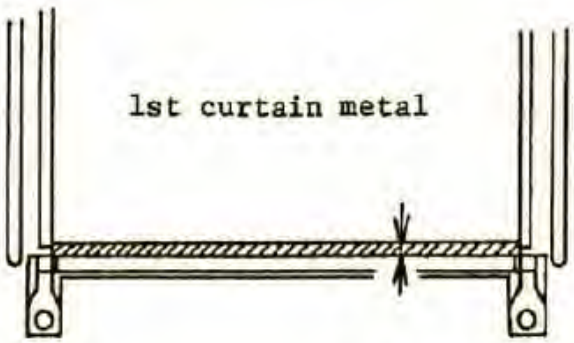


Fig. 50

5. Adjustment of shutter speed

All shutter speeds for this camera are determined by performing the quickest shutter speed 1/1000 (or 1/500 for SLS) adjustment so that the 1/1000ms (or 1/500) should be adjusted as accurrate as possible.

ms	Standard	Max.	Mini.
1/1000	0.98ms	1.6ms	0.7ms
1/500	1.95ms	2.7ms	1.7ms

5-1 Adjusting shutter speed at quick return of mirror

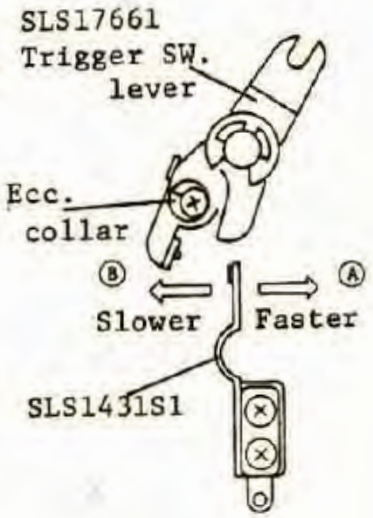
Recheck curtain travel time adjustment before shutter speed adjustments.

A. Adjustment

1) Adjustment by Ecc. collar

a. Set the shutter speed ring to 1/1000 (SLS 1/500).

b. Adjust it by turning the Ecc. collar on the trigger switch as shown in Fig. 51.



When changing space between Ecc. collar and SLS17661 Trigger switch lever wider or narrower, shutter speed should be changed as follows.

Space	Shutter speed
Wider (C)	Slower
Narrower (D)	Faster

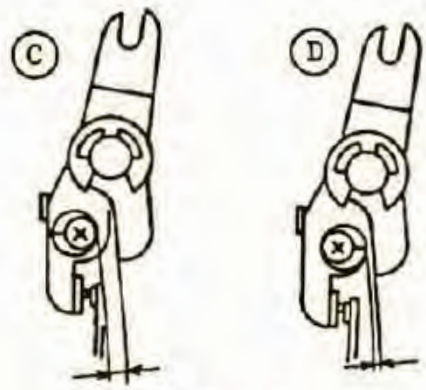


Fig. 51

2) Adjustment by the SLS1431S1 Trigger switch

Fine adjustment is made by bending the trigger switch.

Bend direction	Shutter speed
⇨ (A)	Faster
⇦ (B)	Slower

3) Adjustment by changing overlap of 1st curtain

a. If it is impossible to adjust by step 1) and 2), change the overlap of 1st curtain metal to the 2nd curtain metal by resetting the ribbon pipes of the 1st curtain as shown in Fig. 52.

Note : Please refer to 3-2 to do it. But disassembly F.body and M.body is not necessary.

b. If the overlap of 1st curtain metal is changed, the shutter travel time must be adjusted before shutter speed adjustment.

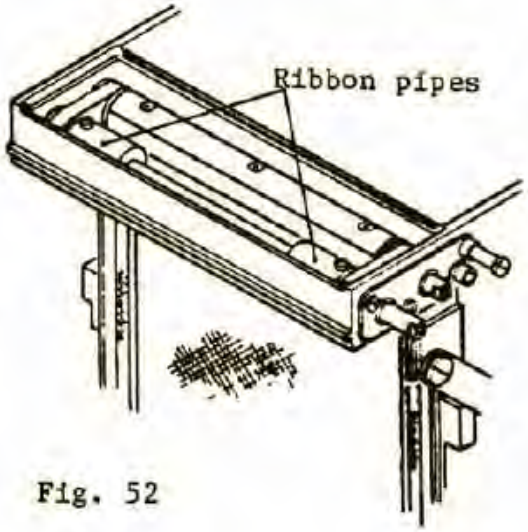


Fig. 52

5-2 Adjusting shutter speed at Mirror-UP

This adjusting machanism has been improved since July 1976 so that adjustment has been simplified.

Installing three improved parts as shown in Fig. 53 into old body can be possible.

Adjusting method for old body is all the same to above step 3).

1) Check for new mechanism

a. Set the shutter speed dial to 1/1000 (SLS 1/500).

b. Set the mirror lock-up mech. to mirror-up.

c. Compare its shutter speed with the speed at quick return of the mirror.

Allowable limit against the shutter speed at quick return of mirror : + 0
- 0.2ms

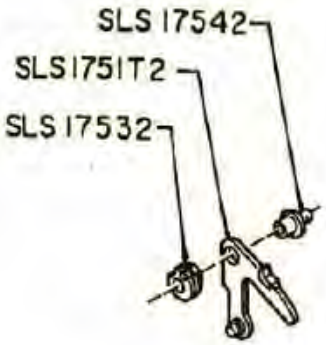


Fig. 53

2) Adjustment

a. Adjustment is made by turning the SLS17532 Ecc.collar as shown in Fig. 54.

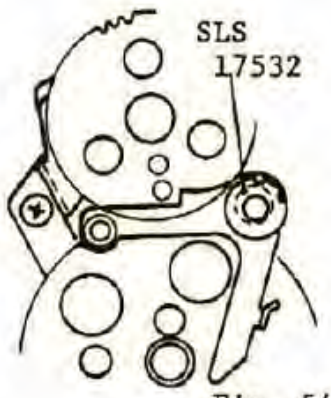


Fig. 54

Turn Ecc.collar	Shutter speed
Counterclockwise	Faster
Clockwise	Slower

Note : When difference of both shutter speed is over 0.5ms, adjustment should be made by changing the overlap of 1st curtain by resetting the ribbon pipes primarily.
Then fine adjustment should be done by the Ecc.collar.

b. If the SLS17532 Ecc.collar is moved, the shutter travel time should be checked.

5-3 Flash synchronization

After performing the shutter curtain bounce and shutter speed adjustment, X and FP delay time should be adjusted.

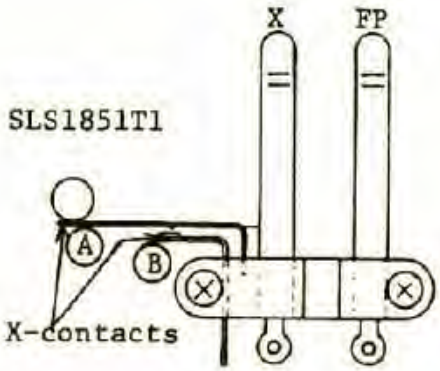


Fig. 55-1

A. X. contact

1) Operation

X-contacts condition with the shutter wound is shown in Fig. 55-1.

When shutter is released, the long contact A is depressed by the SLS 1851T1 X.synchro. lever. Then switch is on as shown in Fig. 55-2.

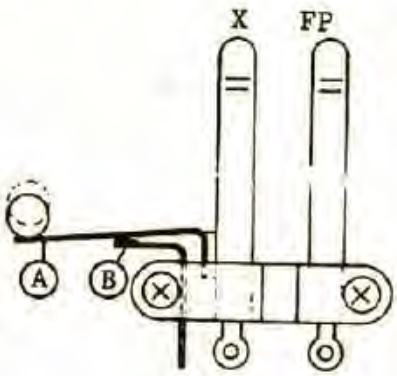


Fig. 55-2

2) Adjustment

When winding the shutter slowly, the 1st curtain metal 1.5mm to 2mm would appear in bottom of film format as shown in Fig. 56.

At this time, adjust it by bending the contact (A) as the contact (A) should detach from the contact (B).

3) X-contact delay time

a. After setting the shutter speed dial to 1/60ms, check it with shutter tester.

b. Adjustment

Adjust delay time by bending contact (A) as follows.

Delay time and Contact efficiency of X and FP

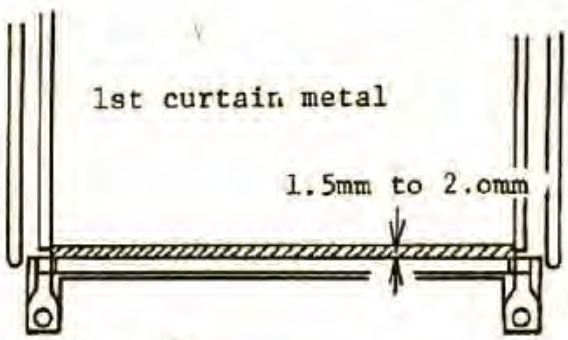


Fig. 56

	Shutter speed	Delay time	Contact efficiency
X	1/60	Slit A:Over 0.3ms B:Over 2.5ms	Over 60%
FP	1/1000 (SLS1/500)	Slit A: B: 7-15ms	Over 60%

B. FP-contact

1) Operation

With the shutter released, the pin (B) is pushed up lower contact by turning the gear (A) clockwise.
Then the switch is on.

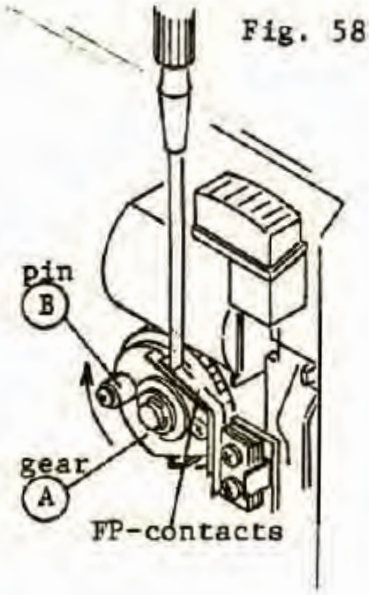


Fig. 58

2) Check

After setting shutter speed dial to 1/1000(SLS 1/500),
check it with shutter tester.

3) Adjustment

Delay time adjustment is made by bending the contacts as shown in Fig. 58.

Note : After assembling the SLT or SLS16201 Right hand side panel, recheck X and FP-contact by all means.

5-4 Bulb mechanism

A. Operation

1) With the shutter dial set to "B", circuit is changed to SW3 in the Main switch SW1 by shifting the SLS20451 Bulb switch arm as shown in Fig. 59.60.

2) While depressing the shutter release button, the SW3 is OFF by the shutter release bar as shown in Fig. 60.
In above condition, as the SLS 1355T1 Main switch is ON, the current is off because the SW3 is OFF.

   So that the 2nd curtain would not run after releasing the 1st curtain.
   Then the shutter opened now.

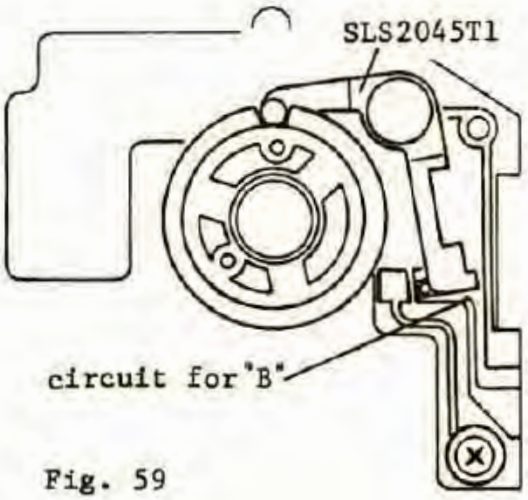


Fig. 59

3) When returning the release button, the SW3 is ON and the current is on. Then the 2nd curtain runs.

4) With the 2nd curtain closed, the Main switch SW1 is OFF.

Fig. 60

B. Main cause of B. malfunction

1) Position of the SLS2045T1 Bulb switch and its contact efficiency

2) Contact efficiency of the brush to SLT20311 Time print board.

3) Contact efficiency of the SW3.

5-5 Delayed Shutter Release

Please refer to page 52-53 of M645 1000S Instructions about use of it.

A. Replacement of Delayed shutter release

1) The arabic numeral in a circle as shown in Fig. 61 indicates the procedure of disassembly and reassembly is normally the reverse of disassembly.

Note : Please refer to "1-4" for replacement of its lever.

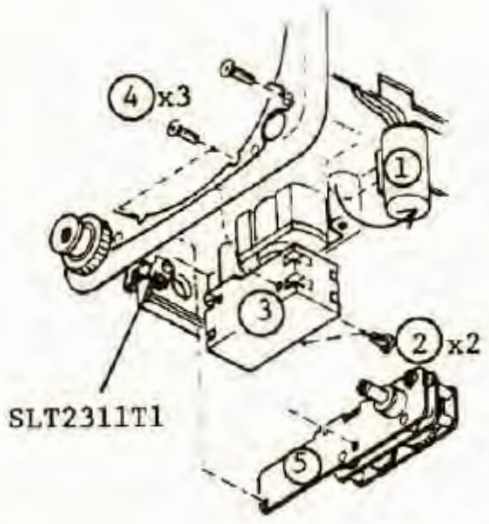


Fig. 61

B. Operation

1) When releasing the Delayed shutter release, first ①-lever moves and continuously ②, ③ and ④ as shown in Fig. 62. The SLS1341T1 Shutter release bar is depressed by the end of ④-SLS 21531 Release lever, so that the shutter is released.

C. Check

1) Releasing position of shutter :

While the SLT21531 Release lever moves from 2mm to 3mm, the shutter should be released.

2) After releasing, the ④-SLT21531 Release lever should move a little move and should return.

3) During operation of the Delayed shutter release, its operating speed must not change remarkably.

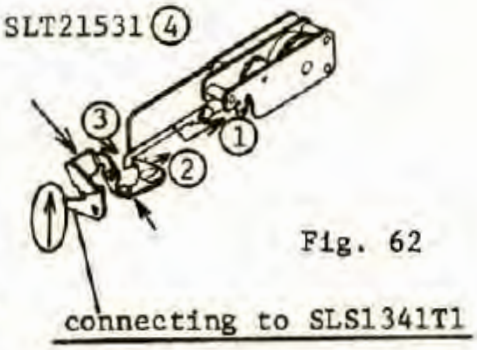


Fig. 62

D. Adjustment

1) Adjustment is made by changing position of the SLT2311T1 Plate as shown in Fig. 61.

2) Apply Screw-lock tight on the two screws after adjusting.

5-6 Release stroke the shutter release button

A. Release stroke

1) While the release button (A) is pushed from 2mm to 3mm, the shutter should be released as shown in Fig. 63-1.

2) When releasing the shutter slowly with pushing the button (B), after releasing, the button (B) should be pushed a little move as shown in Fig. 63-2.

B. Adjustment

Adjustment is made by bending the top of SLS2551T1 Mirror release lever with pincers as shown in Fig. 64.

Note : Bend the top of release lever gently.

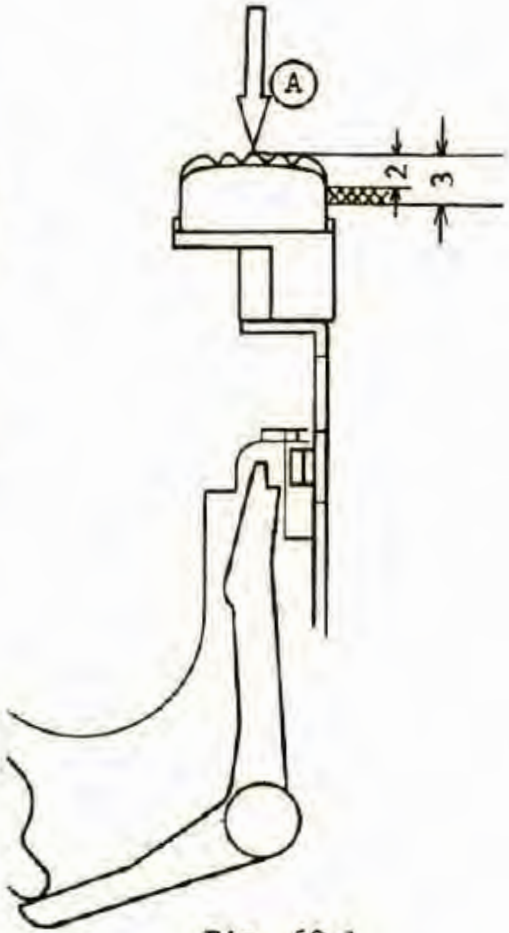
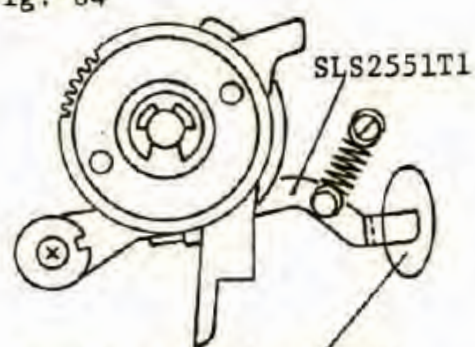


Fig. 63-1

Fig. 64



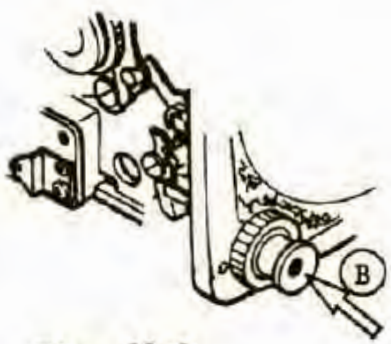


Fig. 63-2

6. Body flange back and Finder infinity

6-1 Body flange back and flat of Bayonet face

A. Check

1) Put the SLS-1 Block gauge and SLS-3 Parallel disc on the SLS-2 Camera body support as shown in Fig. 65 and the set the dial-gauge to Zero.

2) After removing the SLS-1 and SLS-3, install the camera on the SLS-2.

3) Put the SLS-3 on the bayonet surface and then measure four appointed points as shown in Fig. 66.

Standard body flange back :

63.3mm ± 0.03

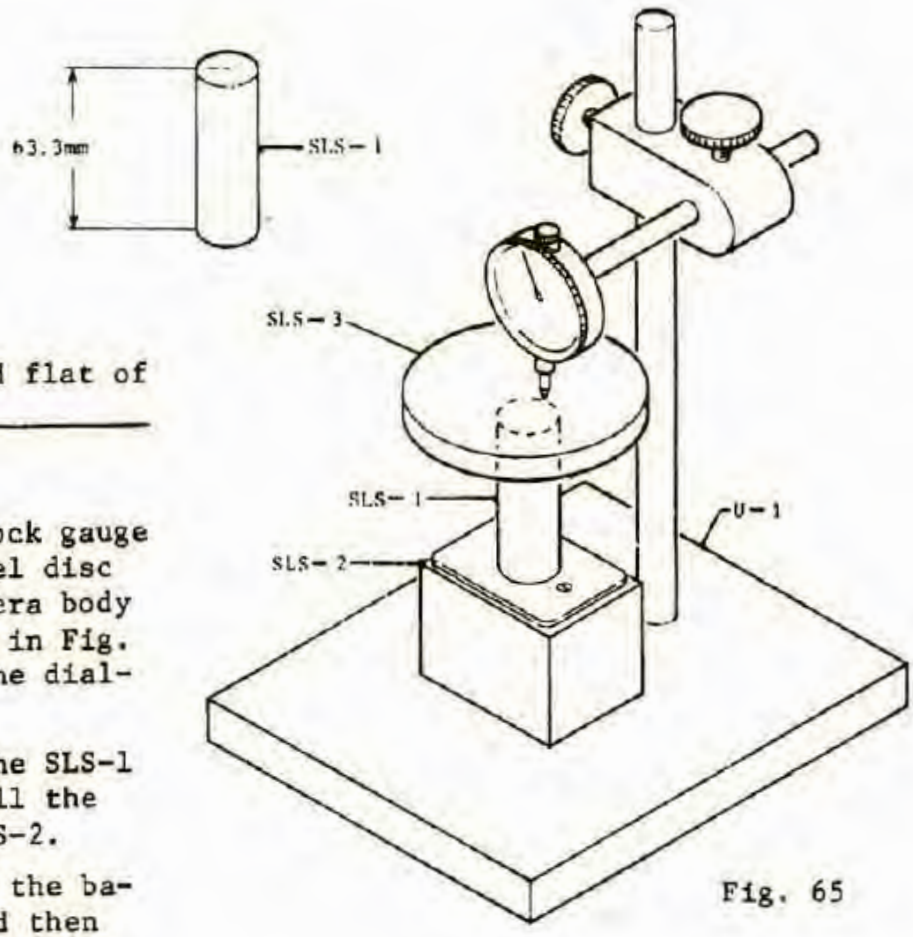


Fig. 65

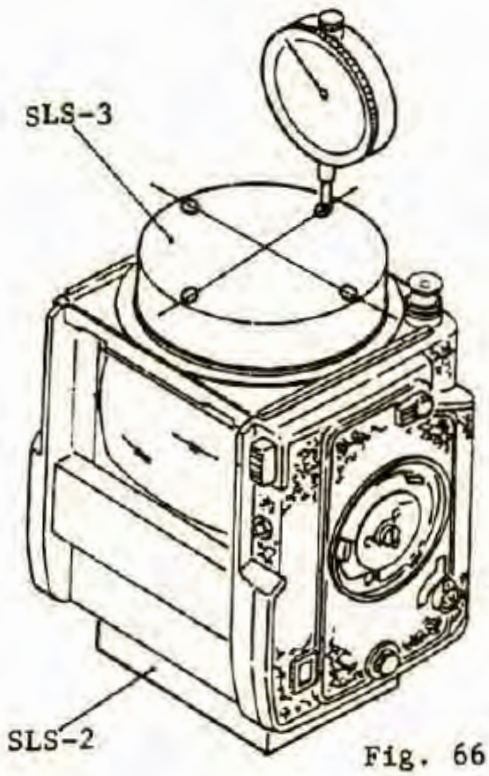
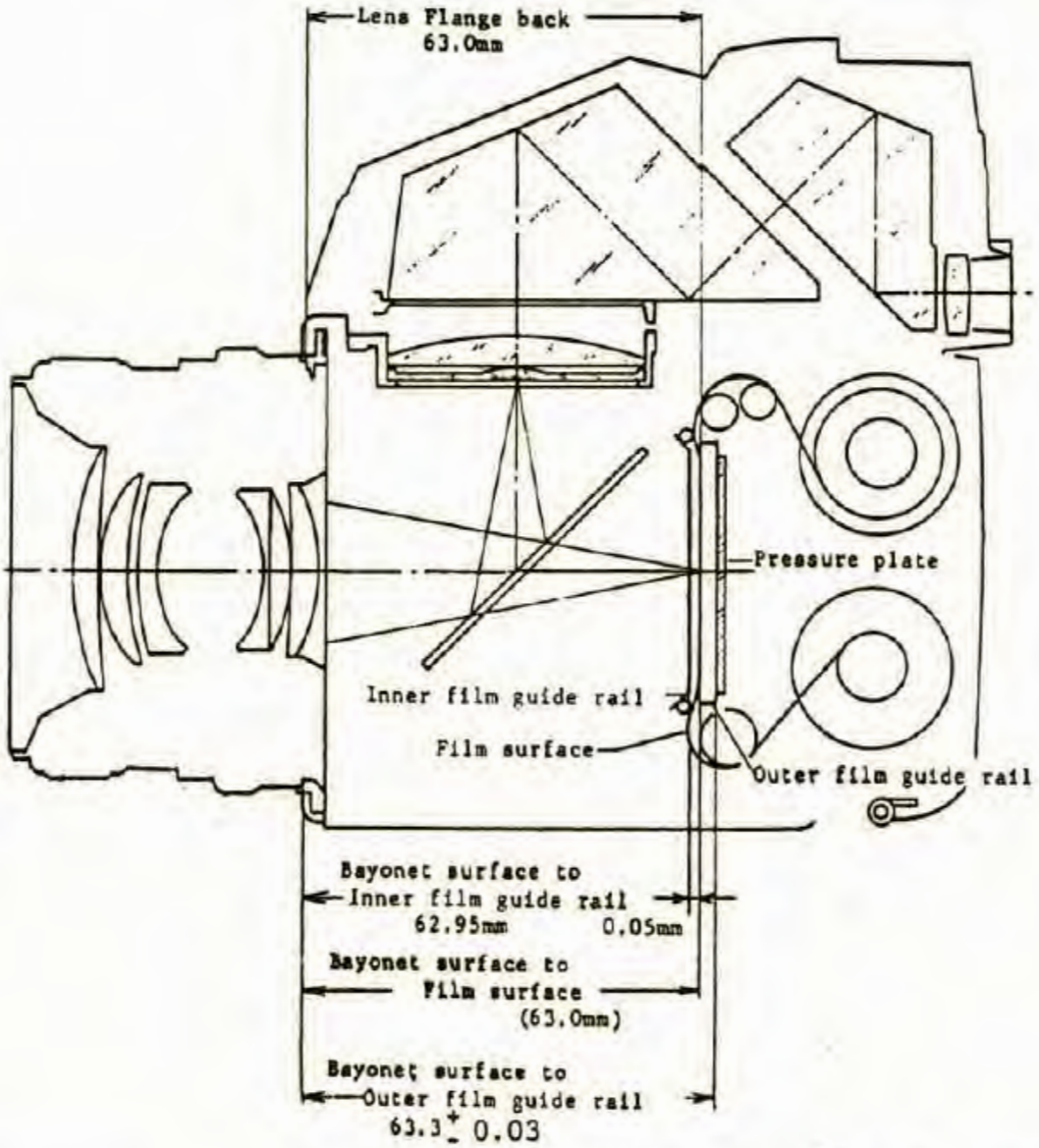


Fig. 66



B. Adjustment

1) Remove eight screws PB2x4BNi of the bayonet ring.
2) Remove the bayonet ring and put adequate washer on the place where it is required.
3) Each points should be with in tolerance 63.3mm±0.03.

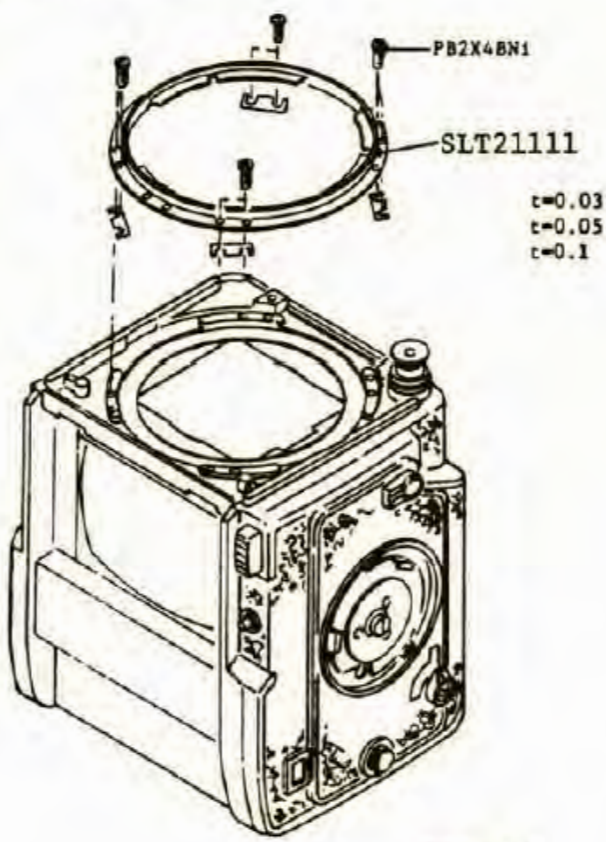


Fig. 67

6-2 Mirror angle 45° degrees

A. Check

1) With the camera on the SLS-5 Mirror 45° stand installed, check the angle with auto-collimeter.

Note : Before checking the mirror angle 45°, should check and amend warp of the SLS2412S1 Holder plate.

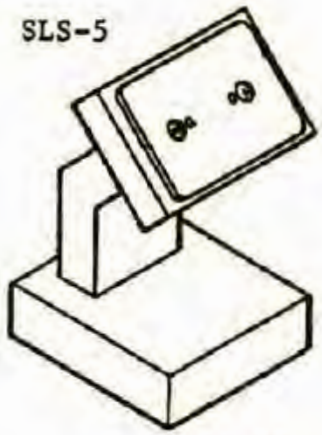


Fig. 68

B. Adjustment

1) After loosening a 3PB1.7x3BNi Screw, adjustment is made by moving the SLS24441 Adjusting plate as shown in Fig.69.

2) Apply Screw-lock-tight on the screw.

Note : Auto-collimator with its focal length 120mm or less than 300mm is much the better for accurate check.

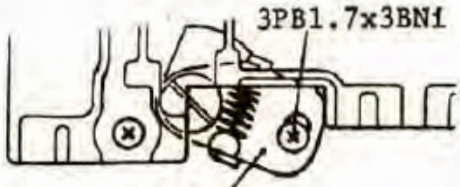


Fig. 69

6-3 Adjusting infinity (∞) of Finder focus

After performing the body flange back and mirror angle 45° adjustment, infinity should be adjusted.

A. Check

Attach the standard lens to camera and check it with magnifier as shown in Fig. 71.

B. Adjusting infinity

1) After removing Focusing screen, adjustment is made by three adjusting screws PB2x5BNi as shown in Fig. 70.

Note : Tighten or loosen three screws evenly.

2) After adjusting, apply Screw-lock-tight on the screws.

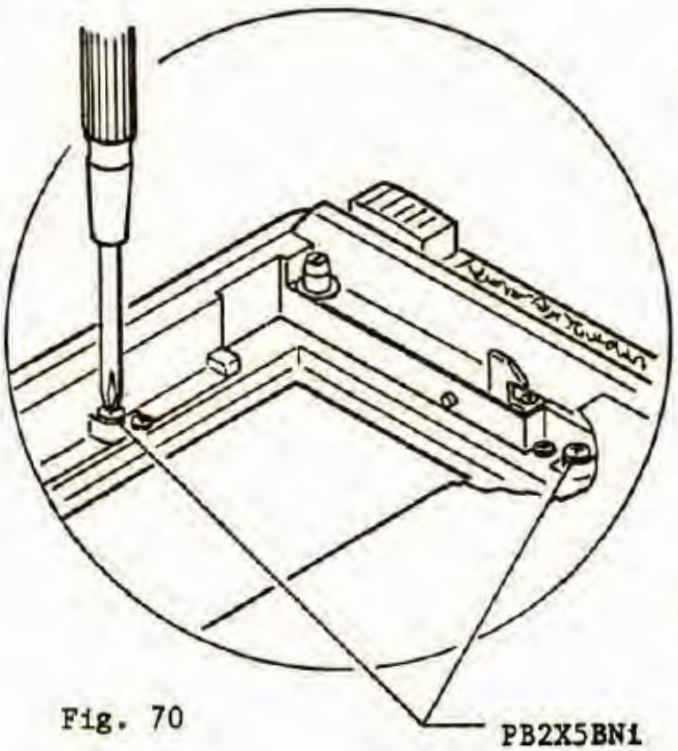


Fig. 70

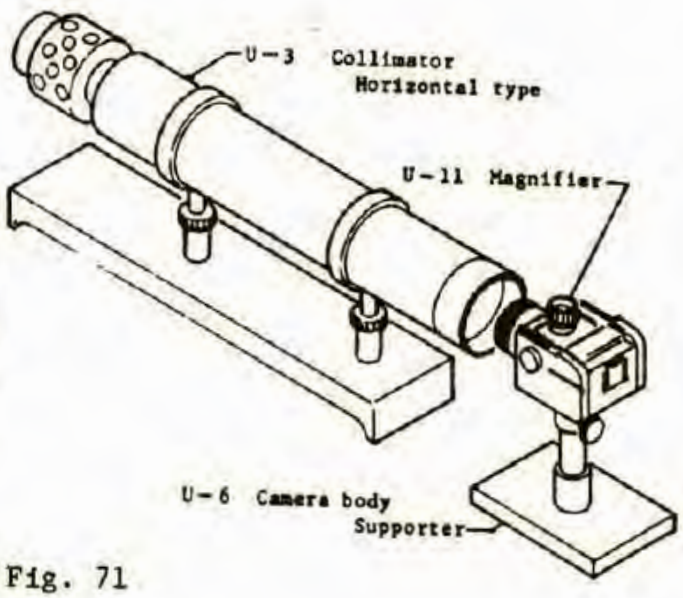


Fig. 71

7. Film transport mechanism

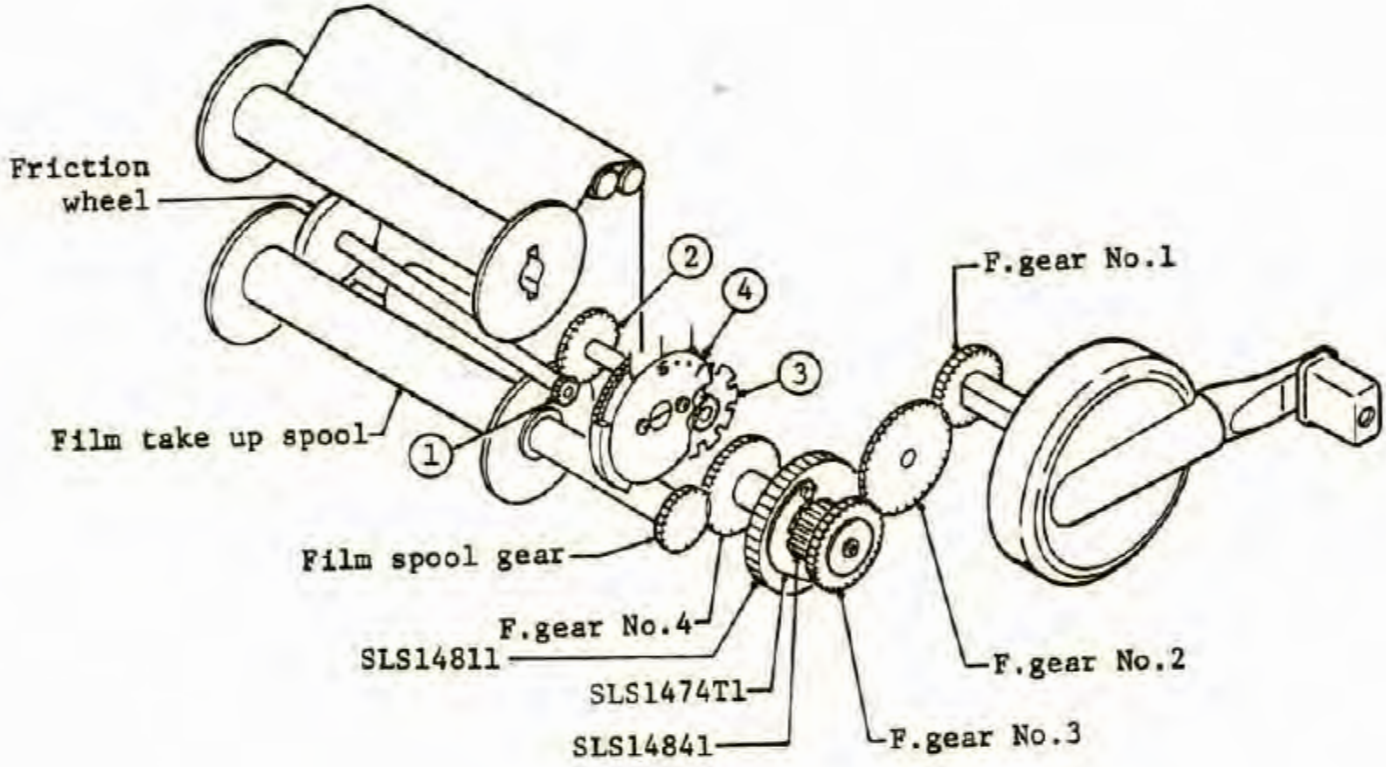


Fig.72

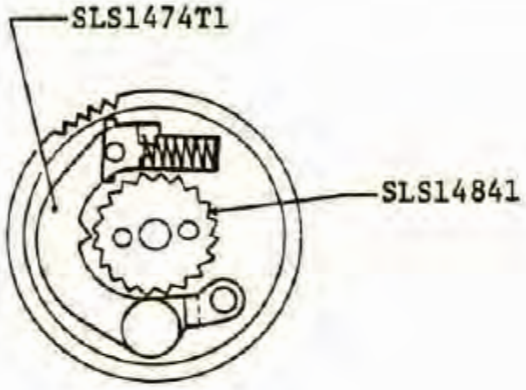


Fig.73

7-1 Film transport

1) With the film advance crank or knob wound, F.gear No. 1, No. 2 and No. 3 rotate.

2) SLS14841 Ratchet gear which is linked with the F.gear No. 3 engages with SLS1474T1 Clutch in the SLS14811 F.clutch wheel.

   Then F.gear No. 4 is linked with the SLS-1474T1 Clutch is turned as well as the SLS14811 F.clutch.

3) When the F.gear No. 4 in the film chamber rotates, the film spool gear in the film insert which is linked with the F.gear No. 4 rotated counter clockwise.

4) The film is wound by the film take up spool rotating.
   The friction wheel attaching to leader paper around the film take up spool is rotated by rotation of the film take up spool.

   Film advance is determined by rotation of the friction wheel.
   Simultaneously (1)-Friction gear rotates (2)-Film counter gear No. 1.
   Continuously rotates (3)-Film counter dividing device and (4)-Film counter.

7-2 From start mark to the first exposure

1) When (4)-Film counter rotates, operation of SLS15842 Stop lever is controlled by protrusion (A) of SLS15521 Film counter disk as shown in Fig. 74.

2) When the film counter reaches to No. 1, the (A)-Protrusion passes over.
(B)-end of the SLS15842 Stop lever gets into (3)-Film counter dividing device and the other end (C)-pawl gets into between teeth of the F.clutch wheel as shown in Fig. 75.
At this time the SLS1474T1 Clutch is detached from the SLS14841 Ratchet gear so that film transport is stopped.

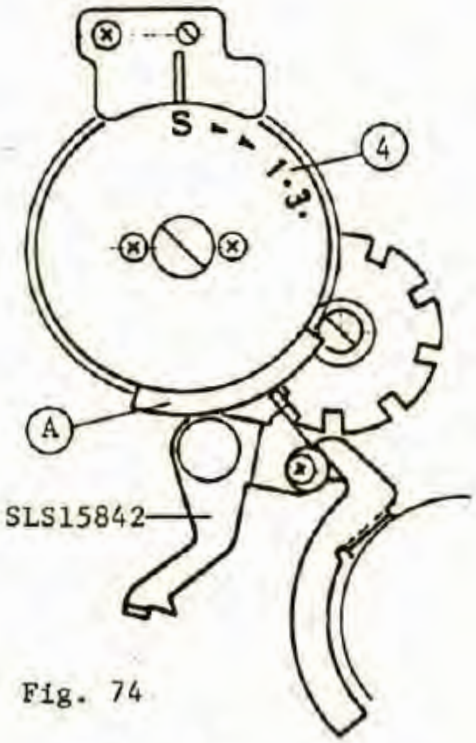


Fig. 74

7-3 Exposure counter No. 2.....

1) With the shutter released, the (D) moves in direction shown by the arrow and then the (B)-end of SLS15842 Stop lever is detached from the (3)-Film counter dividing device and the other end (C) from the F.clutch wheel as shown in Fig. 76.

2) The film advance crank or knob is automatically unlocked.
Make it possible to transport the film to the next frame.

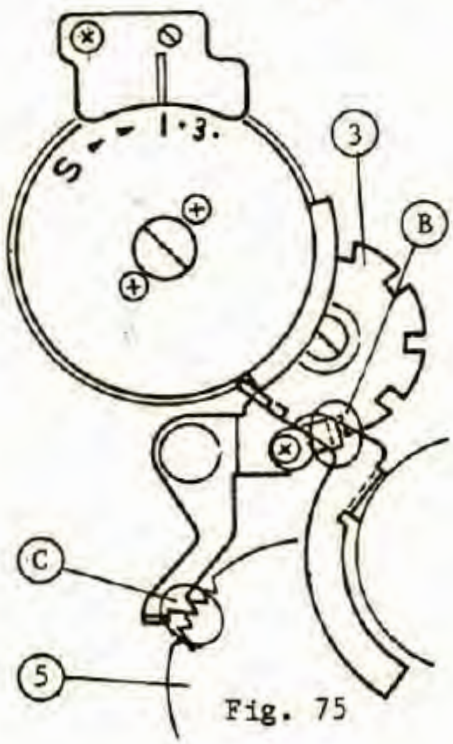


Fig. 75

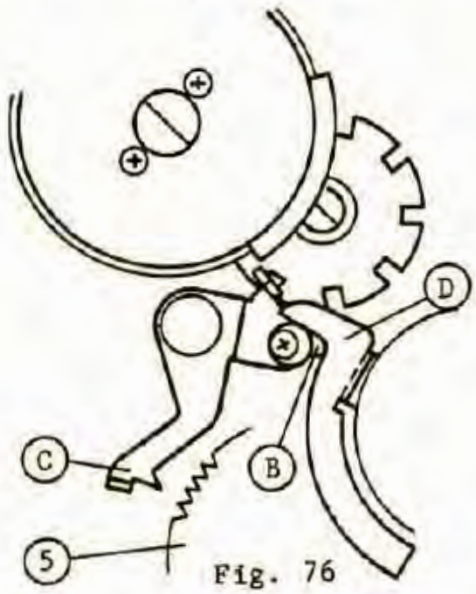


Fig. 76

7-4 After 15 exposures for 120, 30 exposures for 220

1) With 120 Roll-film insert :

When winding the film advance lever more after the fixed number of exposures have been taken (15), turn of the exposure counter is stopped because the (E)-protrusion on back of SLS15521 Film counter base strikes against the SLS1571T2 Change-over lever as shown in Fig. 77-1.

2) With 220 Rool-film insert :

With 220 Roll-film insert set into body, the SLS1571T2 Change-over lever is pushed up in direction shown by the arrow.

Therefore, after the fixed number of exposures have been taken (30), the (E)-protrusion strikes against the SLS15611 Stopper as shown in Fig. 77-2.

3) In above steps 1) and 2), the SLS1541T1 Dividing device is stopped in position to prevent movement of the SLS15842 Stop lever.

Above means that the end (B) of SLS15842 Stop lever is on the top of the dividing device and can not get into its groove as shown in Fig. 77-1 and 77-2.

4) (1)-Friction gear that conveys rotation of the friction wheel engages with (2) SLS-1531S1 Film counter gear No. 1.

As the film is wound further, (2)-Film counter gear No. 1 is pushed aside by rotation of the (1)-Friction gear as shown in the Fig. 78 because (4)-Film counter is stopped.

Therefore, they are disengaged from each others.
Consequently, the film spool gear turn freely to wind film only without advancing the exposure counter.

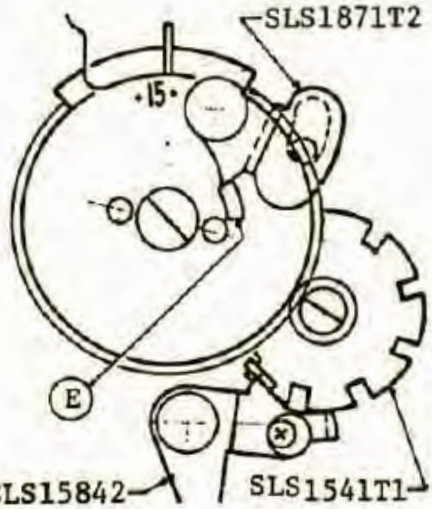


Fig.77-1

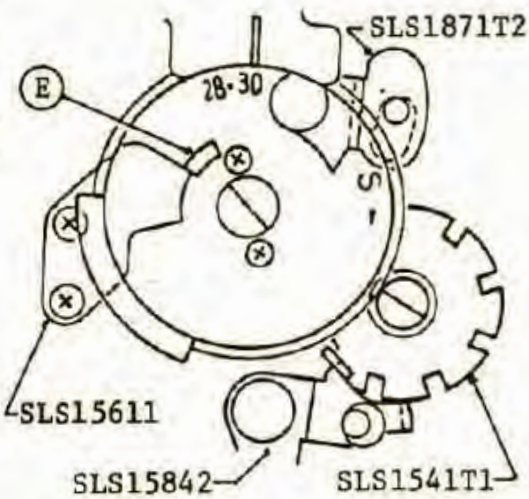


Fig.77-2

(Pushed aside)

Fig. 78

7-5 Reset to starting position "S"

1) When opening the back cover, both ends of the SLS15842 Stop lever are detached from the SLS1541T1 Dividing device and from the SLS14811 F.clutch wheel by the SLS15812 Zero reset lever moving as shown in Fig. 79.

2) As removing the Roll-film insert, the exposure counter will reset to "S" because SLS4182T1 Gear in the Rool-film insert disengages from SLS1531S1 Gear in the F.body.

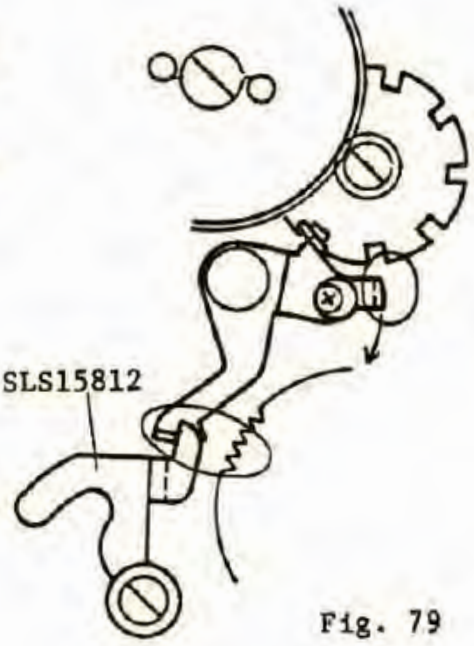


Fig. 79

7-6 Multiple-Exposure mechanism

When setting the multiple-exposure lever to Multi, the double-exposure prevention mechanism is disengaged, so that the shutter can be cocked with the film advance crank or knob without moving the film, making multiple-exposures possible.
In this case, the exposure counter does not advance.

1) When setting the multiple-exposure lever to Multi, the SLS15242 Cam turns about 1/4 turn (90°) in direction shown by the arrow in Fig. 80.
2) As the ① -Lever moves in direction shown by the arrow, the F.clutch wheel is turned counterclockwise by Ⓐ -pawl engages with the SLS 14811 F.clutch wheel.
3) The SLS1474T1 Clutch in the F.clutch wheel moves in direction shown by the arrow.
   Consequently, it is detached from the SLS14841 Ratchet gear as shown in Fig. 81.
4) If winding the film advance crank or knob, the F.clutch wheel does not rotate so that the film is not advanced.

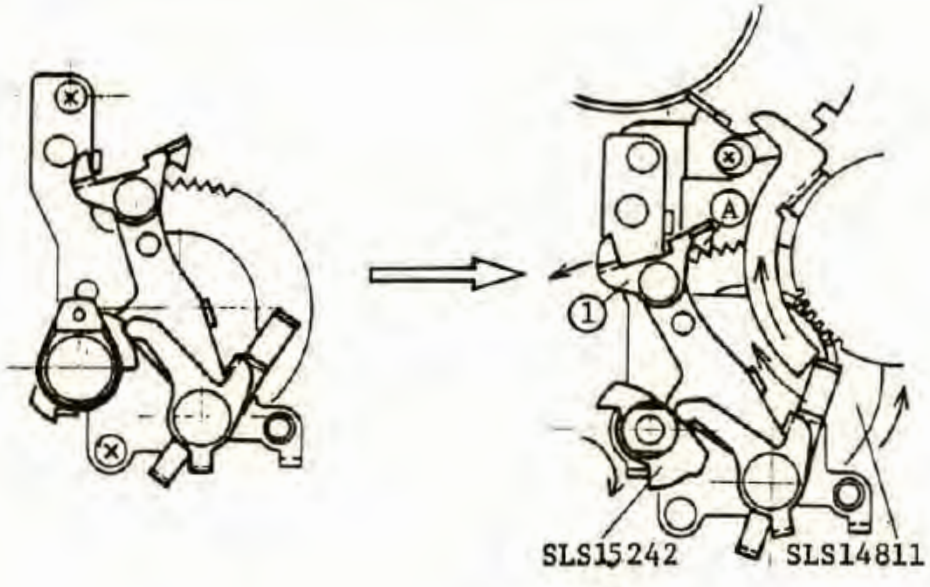


Fig.80

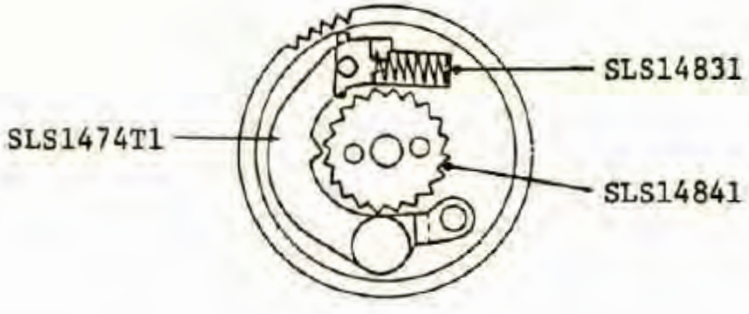


Fig.81

7-7 Determine SLS1554T1 Film counter gear

A. Determine SLS15611 Stopper :

1) Install the SLS-17 Position gauge to the SLS15561 Shaft as shown in Fig. 82.

2) Loosen two screws of the SLS15611 Stopper.

3) Tighten two screws by pushing down the stopper with left hand index finger.

4) Apply screw-lock tight on the two screws.

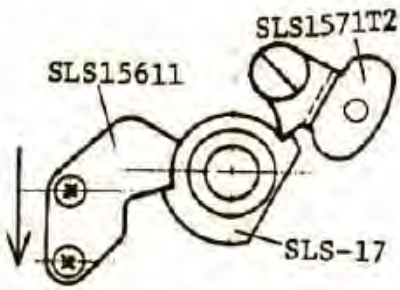


Fig. 82

B. Determine SLS1541T1 Dividing device :

1) When the exposure counter indicates to "S" (start), engage SLS1541T1 Dividing device with the SLS1554T1 Film counter gear as end (B) of the SLS15842 Stop lever should be determined as shown in Fig.83.

2) Fine adjustment :

Fine adjustment is made by turning the Ecc.dowel after loosening two screws of the SLS15521 Film counter base.

3) Check :

After adjusting, install the 120-type roll-film insert into the camera body and check that the film can be completely wound onto the take-up spool with out stopping at the exposure counter 16.

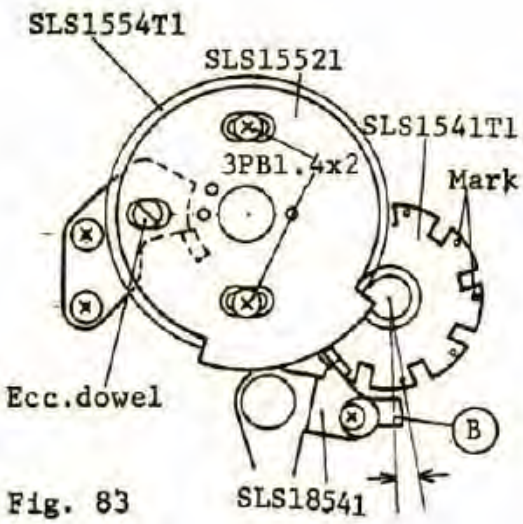


Fig. 83

7-8 Position of SLS15842 Stop lever

As we already have informed you with technical bulletin 078-M645-03, the stop lever is modified.

First describe about new lever and next about old one.

A. New SLS15842 Stop lever

1) Position of the stop lever

a. When releasing the shutter, the clearance between the stop lever and the dividing device should be over 0.3mm as shown in Fig. 84.

b. With the film advance lever fully wound, the pawl of the SLS15842 Stop lever get into the dividing device certainly.

c. Install the 120-type roll-film insert into the camera body and check that the film can be completely wound onto the take-up spool without stopping at the exposure counter 16.

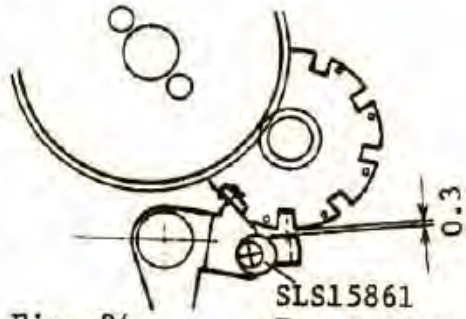


Fig. 84

2) Adjustment

Adjustment is made by turning the SLS15861 Ecc.collar.

B. Old type stop lever

1) Position of the stop lever :

When the stop lever get into the dividing device after winding the shutter, the clearance between stop lever and bottom of groove of the dividing device should be 0.4mm to 0.6mm as shown in Fig. 85.

2) Adjustment

a. Free the (A)-spring and loosen 3PB1.7x 1.3BNi Screw.

b. Push the pawl of SLS14911 Lever in direction shown by the arrow lightly. Adjustment is made by moving SLS15841.

c. After adjusting, apply Screw-lock tight around the screw.

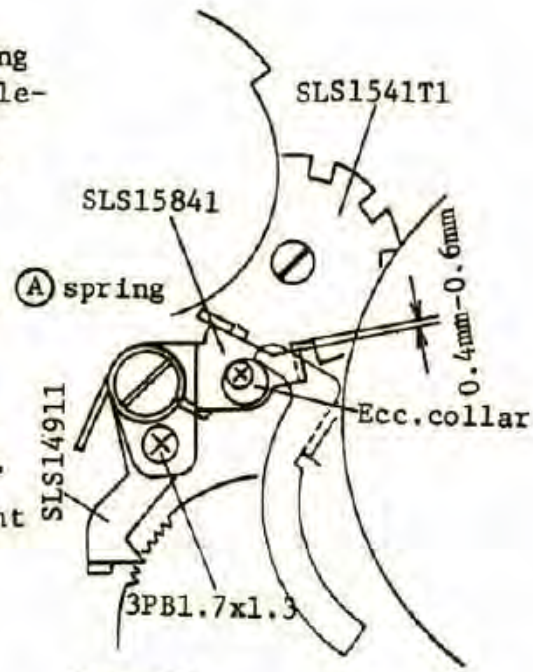


Fig. 85

3) Position of the ecc.collar :

a. Check

1. Install the 120 type roll-film insert into the camera body and check that the film can be completely wound on to the take-up spool without stopping at the exposure counter 16.
2. Each film advance must be made at a single revolution of the film advance crank or knob.

b. Adjustment :

1. Adjustment is made by turning the ecc.collar.
2. After adjusting, apply Screw-lock tight on the screw.

7-9 Check and adjustment of the first exposure frame position on film

Draw three lines at a distance of 218mm $^{+12}_{-7}$ from the start mark in the 120 type roll-film as shown in Fig. 87.

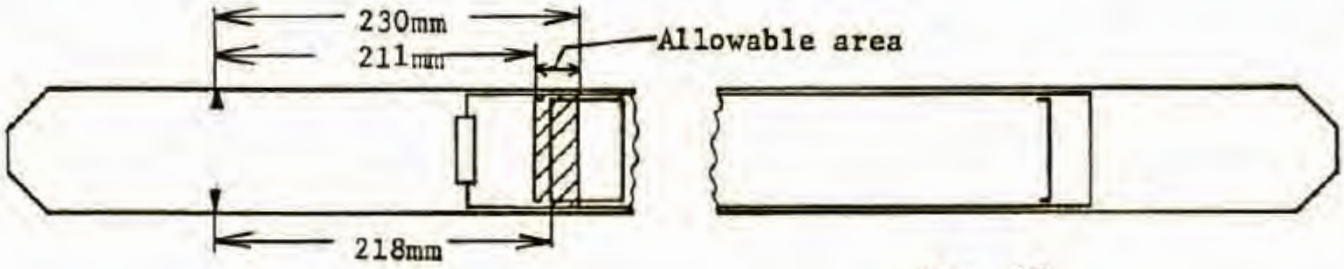


Fig. 87

A. Check the first exposure frame position :

1) Load the above film is marked in the 120 film insert and install it into the camera body.
2) Set the shutter speed dial to "B".
3) Wind the film advance crank or knob until it stops. Depress the release button and keep it depressed position.
4) Check the first exposure frame is in the tolerance.

B. Adjustment :

1) It is without the tolerance, readjust 7-7 and 7-8.
2) Fine adjustment is made by turning the ecc.dowel in the SLS1554T1 Film counter gear after loosening two screws 3PB1.4x2BNi as shown in Fig.83.

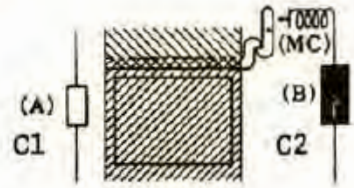
8. Moving Coil mode, Electronic circuit and parts

8-1 Electronic circuit

A. The exposure time control capacitor C1 discharges :

1) With the film advance crank or knob wound, the C1 capacitor discharges completely by switch-on of SW2 Trigger switch.

2) At this time, the moving coil capacitor C2 is charged at peak voltage of the battery.

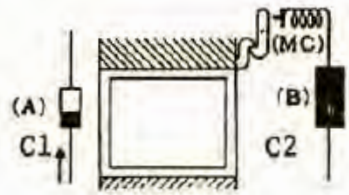


B. Beginning of charge to C1 capacitor

1) When depressing the shutter release button, the 1st curtain runs and the shutter is opened.
Simultaneously, the SW1 Main switch is on.

2) When the 1st curtain moves, the SW2 Trigger switch is off and then the exposure time control capacitor C1 begins to charge.

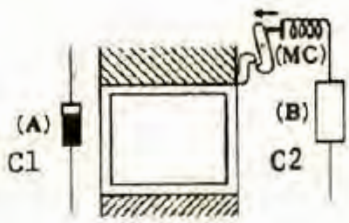
3) The charge-time of capacitor C1 is determined by VR1 (Shutter speed).



C. Determining exposure time :

1) When the capacitor C1 reaches the determined voltage in VR2, the moving coil is moved by I C.

2) Capacitor C2 discharges, energizing the moving coil which in turn moves the 2nd curtain runs and the shutter is closed.

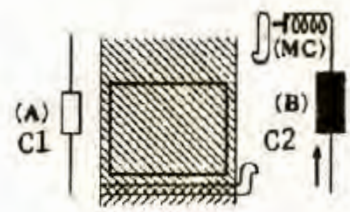


D. Charge to capacitor C2

1) With the 2nd curtain closing, SW1 main switch is off and then capacitor C2 charges.

2) The charge-time is extremely short and accomplished by very little electric power.

Battery performance is maintained at a high level, as indicated in the accomanying diagrams, as the moving coil condenser is normally charged keeping the battery at peak voltage.
Thus the battery is protected from drops in voltage, as when the switch is on.



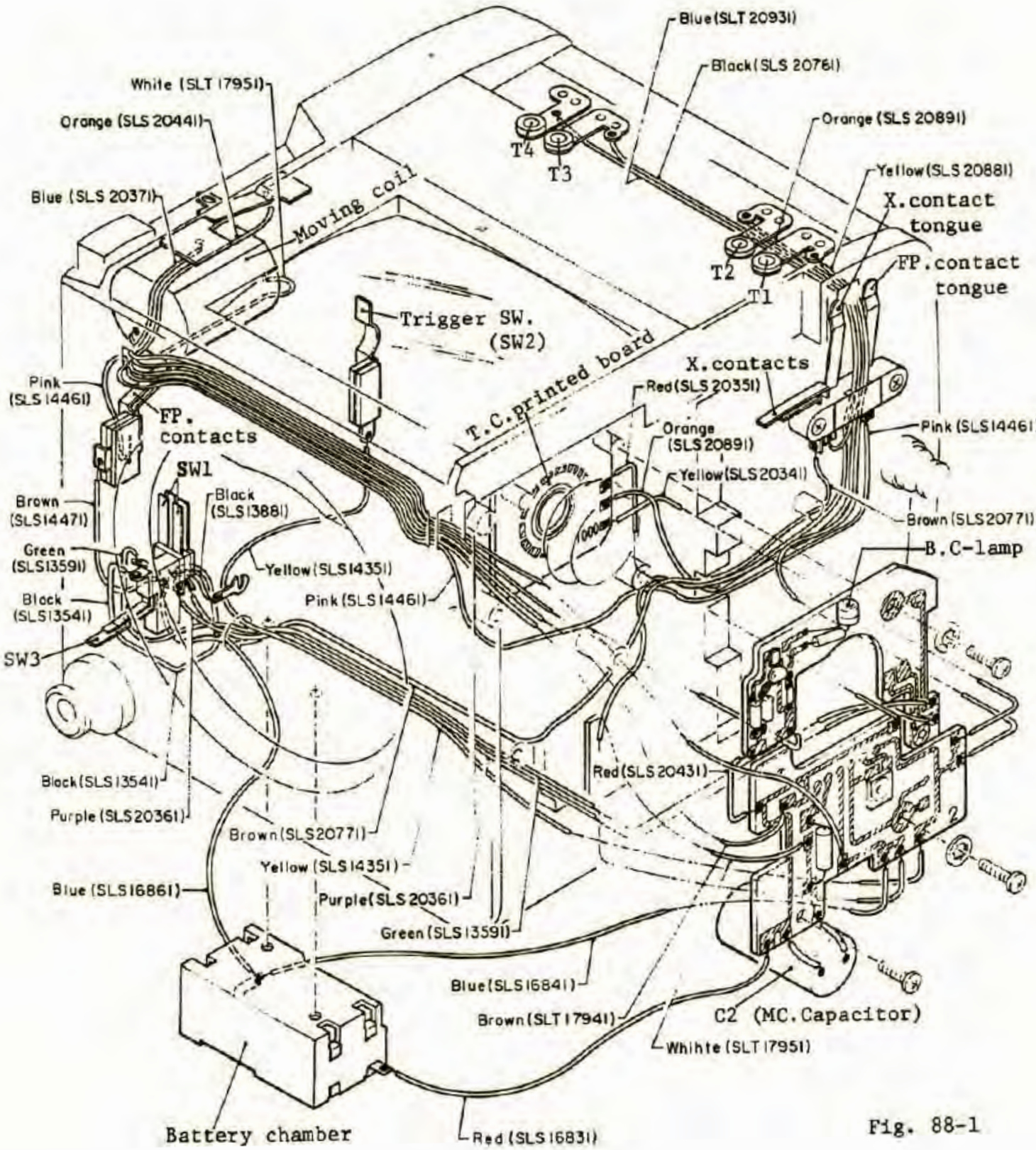

Blue (SLT 2093I)
Black (SLS 2076I)
White (SLT 1795I)
Orange (SLS 2044I)
Orange (SLS 2089I)
T4
T3
Yellow (SLS 2088I)
Blue (SLS 2037I)
Moving coil
X. contact tongue
T2
T1
FP. contact tongue
Trigger SW. (SW2)
T.C. printed board
X. contacts
Pink (SLS 1446I)
FP. contacts
SW1
Red (SLS 2035I)
Orange (SLS 2089I)
Pink (SLS 1446I)
Yellow (SLS 2034I)
Brown (SLS 1447I)
Black (SLS 1388I)
Brown (SLS 2077I)
B. C-lamp
Green (SLS 1359I)
Yellow (SLS 1435I)
Black (SLS 1354I)
Pink (SLS 1446I)
SW3
Red (SLS 2043I)
Black (SLS 1354I)
Purple (SLS 2036I)
Brown (SLS 2077I)
Yellow (SLS 1435I)
Blue (SLS 1686I)
Purple (SLS 2036I)
Green (SLS 1359I)
Blue (SLS 1684I)
Brown (SLT 1794I)
C2 (MC. Capacitor)
Whihte (SLT 1795I)
Battery chamber
Red (SLS 1683I)

Fig. 88-1

Electric Circuit Diagram

(For M645 1000S)

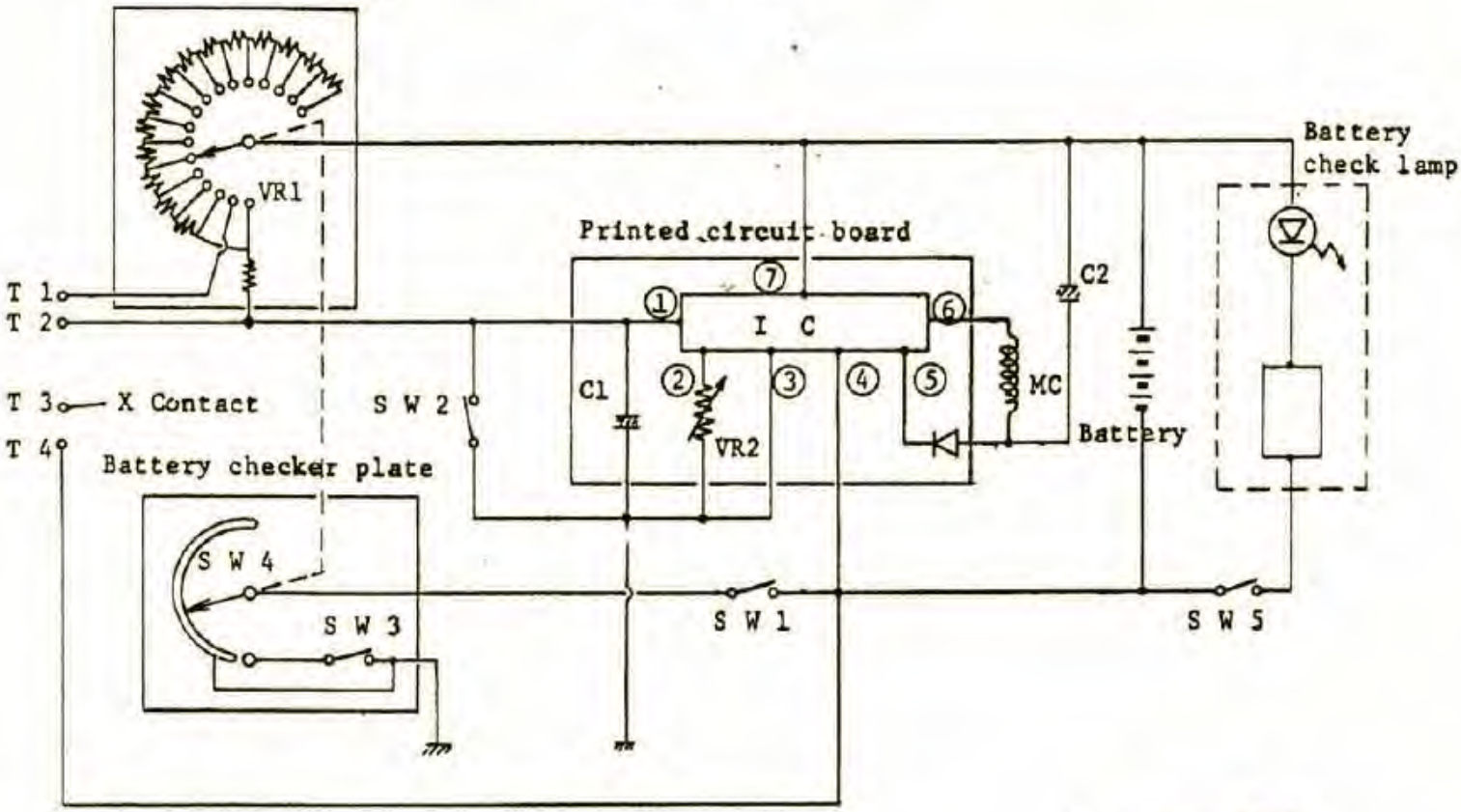


Fig. 88-2

Electric Circuit Diagram

(For M645 500)

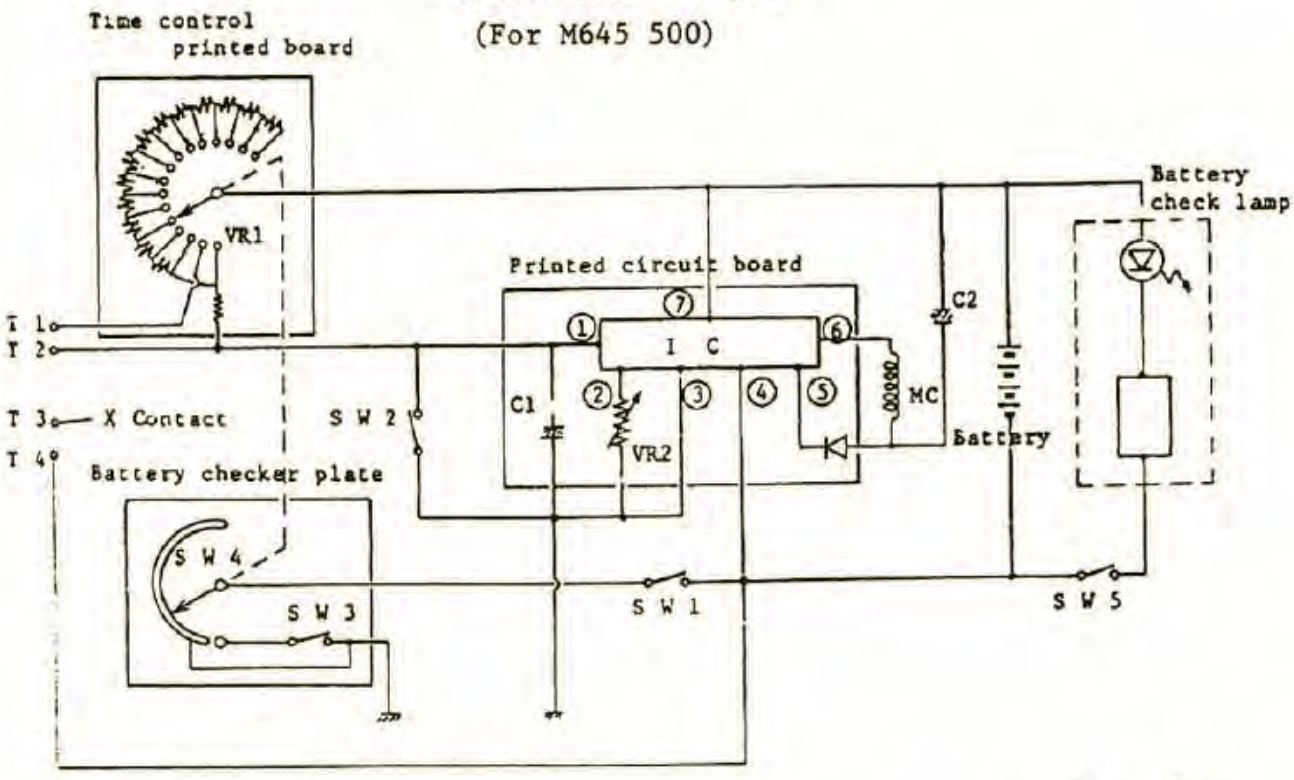


Fig. 88-3

SLT2064S1 Printed circuit board
for M645 1000S

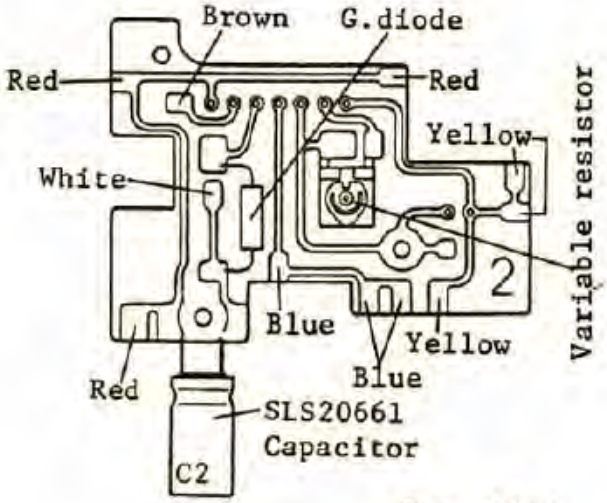


Fig. 88-4

SLT20311 Time control
printed board for
M645 1000S

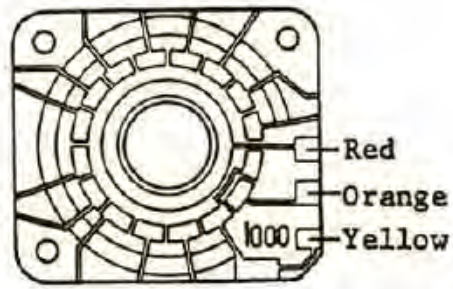


Fig. 88-5

SLS2064S1 Printed circuit board
for M645 500

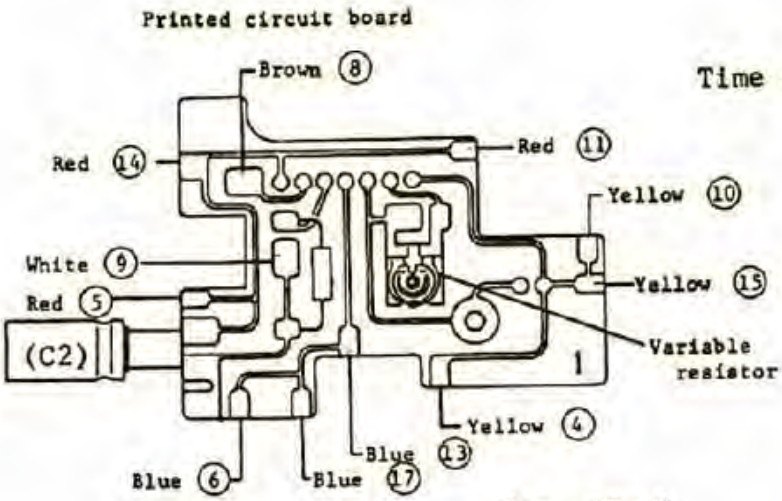


Fig. 88- 6

SLS20311 Time control
printed board for
M645 500

Time control printed board

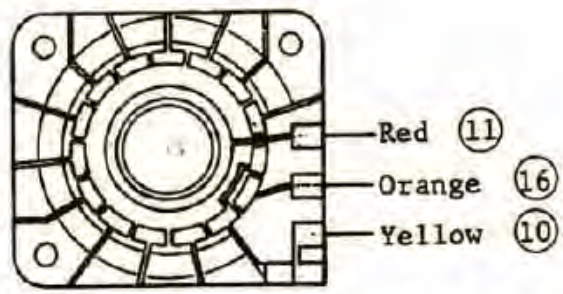


Fig. 88-7

Battery checker plate
SLS2041S1 for M645 loooS and M645 5000

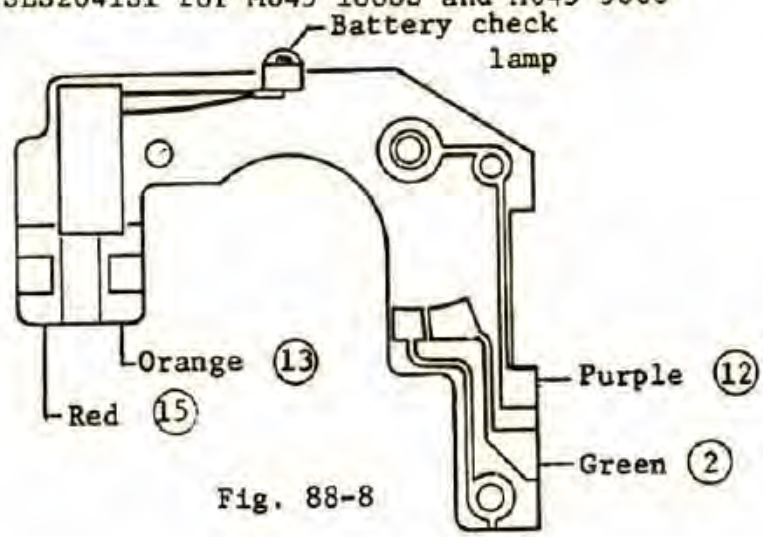


Fig. 88-8

8-2 Check and replacement of the Moving coil (M.C)

Before replacement the M.C, check the following points without fail.

A. Check

1) Battery voltage : 6 V

2) Battery chamber (SLT1671T1, SLS1671T1) :

Check electric current by the Tester.
If not , check following three points.

a. Looseness of (+) and (-) terminals in the chamber.

b. Malsolder of lead wires to the chamber.

c. Dirty and weakend terminals.

3) Operation of the trigger switch (SW2) :

a. With the shutter cocked, the SLS1431S1 Trigger switch must be switched on as shown in the Fig. 89-1.

b. With the shutter released, the trigger switch must be switched off as shown in the Fig. 89-2.

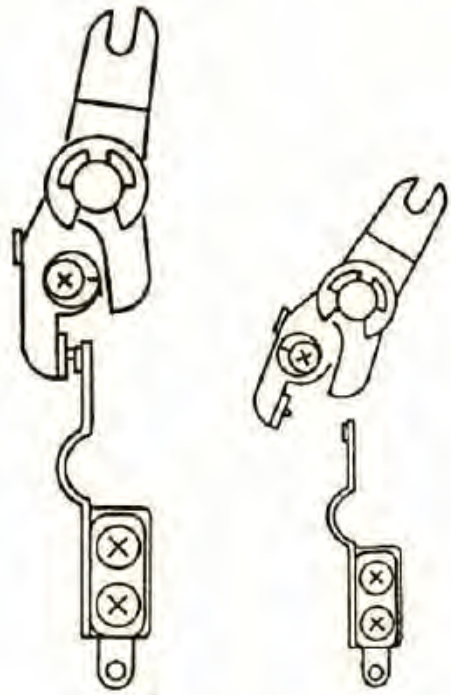


Fig. 89-1 89-2

4) Operation and electric current of the Main switch (SW1) :

a. Operation :

1. Set the shutter speed dial to " B ". While depressing the shutter release button, never return it, check that the lever (A) pushes contacts of the main SW1 as shown in the Fig.89-3.

2. Is the SLS13841 Spring not out of its place ?

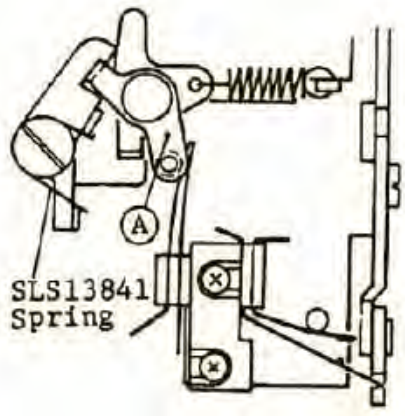


Fig. 89-3

b. Electric current :

Remove the battery from the body. Then release the only 1st curtain by pressing the shutter release button.

In above condition, check electric current by using the Tester as follows.

Tester range.....X100

Tester terminal red(+)....Purple leadwire

Tester terminal black(-)..Blue leadwire

Tester needle should move to Zero
If not, check following four points.

1. Malsolder of purple and blue lead wires.
2. Sufficient contact efficiency of the SW1.
3. Dirty contacts of the SW1.
4. Is the SW1 installed tightly ?

5) Operation of the Bulb switch-over lever See "5-4".

6) Check also "8-4" electronic circuit and parts.

7) Check of the M.C :

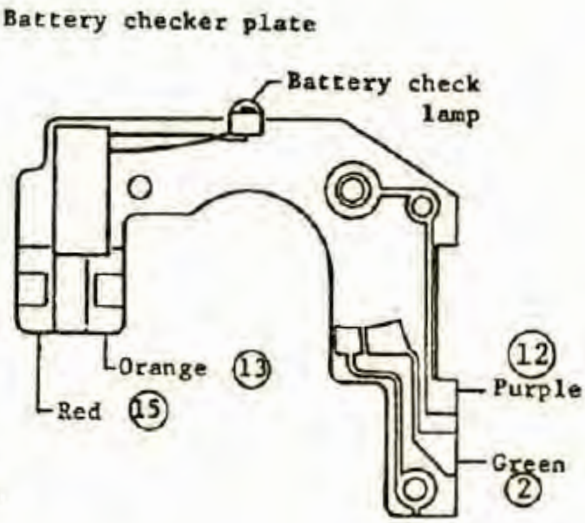
Remove the battery from the body and unsolder brown and white lead wires from the printed circuit board as shown in the Fig. 90-1.

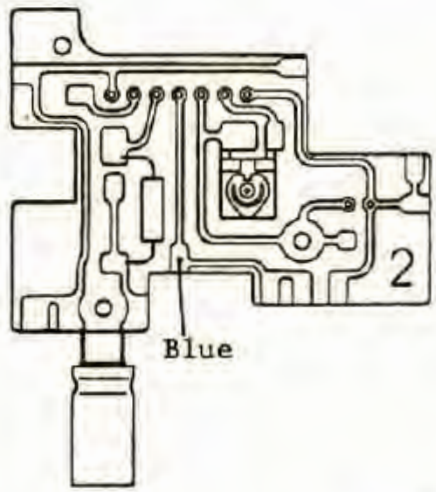
Tester range.....X 1

Tester terminal red (+)....White leadwire

Tester terminal black(-)....Brown leadwire

Tester needle must indicate between 5 Ω and 10Ω and the M.C shaft must thrust out. If not, the M.C is wrong.





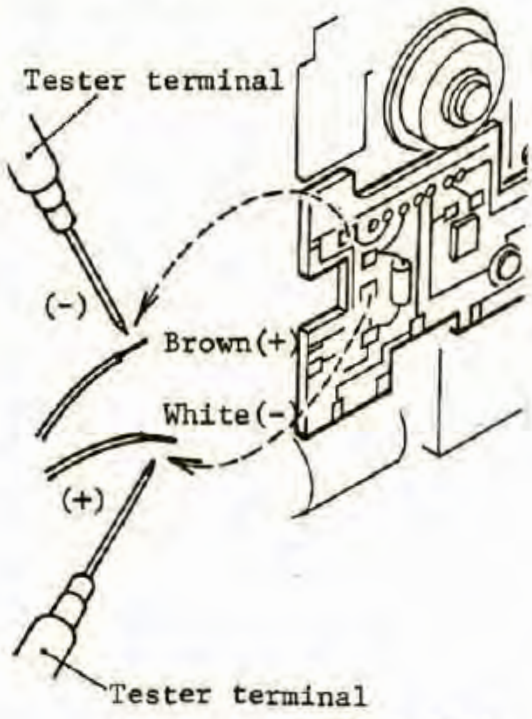


Fig. 90-1

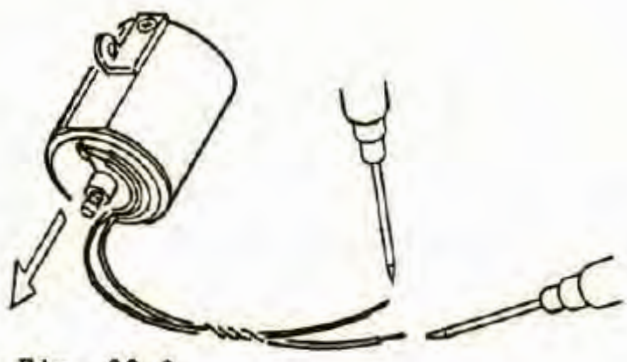


Fig. 90-2

B. Replacement of the moving coil

1) Remove the M.C from the body

a. Remove SLS11551 and SLT17931 Screws as shown in the Fig. 91-1.

b. Remove the M.C with brown and white lead wires from the body.

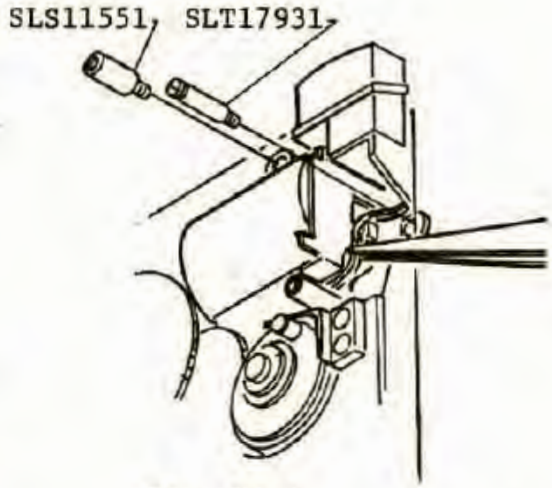


Fig. 91-1

2) Installing new M.C :

a. Check its operation by the Tester

Note : Do not apply 6 V to the M.C directly.

b. The pole on the M.C where the brown lead wire is soldered is plus (+) and the other pole with white lead wire is minus (-).

Note : (+) and (-) pole of M.C is different among moving coils. Brown lead wire is for plus pole and white one is for minus pole. When changing M.C or its lead wires, never mistake (+) and (-) poles.

c. Install the M.C into the camera body.

Note : Do not pinch blue, orange, brown and white lead wires under the M.C.

d. Put in order brown and white lead wires as shown in the Fig. 91-1 and do not make it touching to the release bar.

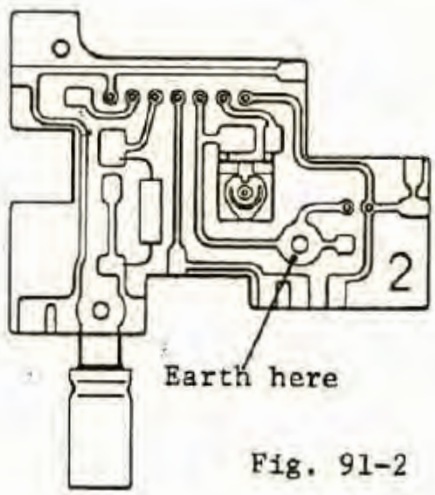


Fig. 91-2

e. Insulation of M.C :

Tester range.....X 1

Tester terminal red(+).....White and brown lead wire alternately

Tester terminal black(-)...Earth as shown in Fig. 91-2

With above test, the M.C must be in insulation.

f. Recheck voltage and operation of M.C.

g. Solder brown and white lead wires to the printed board.

h. Insert battery into the battery chamber and check operation of M.C by releasing shutter.

8-3 Replacement SLT2064S1 Printed circuit

This printed circuit maybe very seldom to replace for its malfunction or damage.
If it is necessary, check following points.

A. Adjusting the variable resistor as shown in Fig. 92.

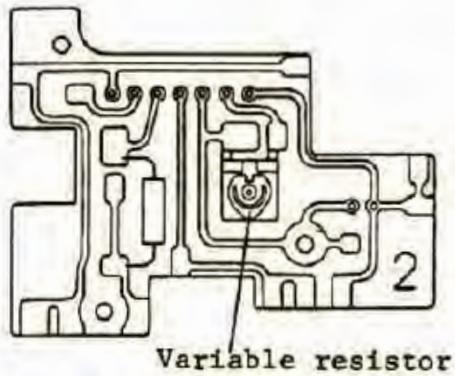


Fig. 92

1) After performing the curtain travel time and shutter speed adjustment, set the shutter dial to 1/60sec..

2) Check its shutter speed.

   A.slit.....15.8ms to 17ms

3) Adjustment is made by the variable resistor.

4) After rechecking the curtain travel time, check and adjust 1/1000sec. (SLS 1/500).

5) Check also X.synchro. delay time.

8-4 Check electronic circuit by Tester

A. Circuit

Check place	Its purpose	Battery	S.P Dial	Tester Range	Tester terminal		Tester indicator
					Red	Black	
T 1-T 2	Current for P.D finder	With	◎	D C 10 V	T 2	T 1	Shutter runs O K
T 2-T 4	Battery voltage for P.D finder	With	◎	D C 10 V	T 2	T 4	6 Volt
T 3-Body earth	X.Synchro.contact When attaching finder	With	1/30	X 1	Body earth ↕ Synchro.cover		Current during shutter moves.....O K
T 4-Body earth	Short between minus circuit and body earth	With-out	Except ◎	X 1	Body earth	T 4	Must not move
Bulb	Its operation	With	B	D C 10 V	Red T: Green or purple lead wire	Black T: IC pin No.4 blue lead wire	After winding and releasing —6 Volt. During "B"—0

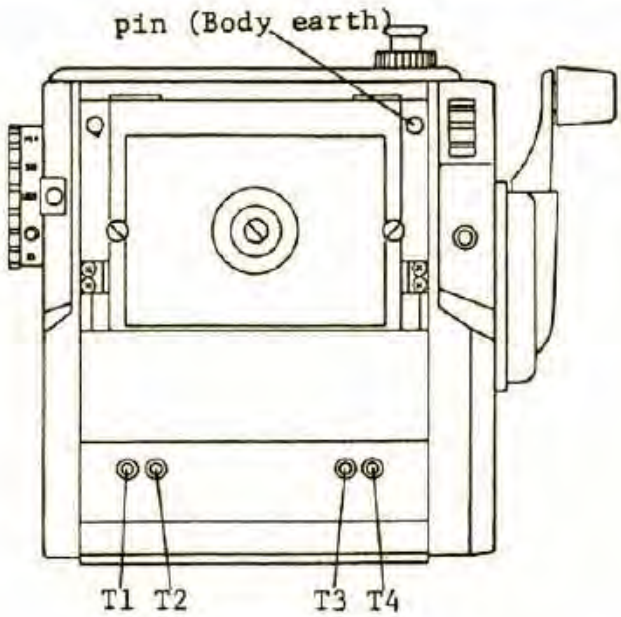


Fig. 93

Connect terminal

T 1 : for shutter speed input at the shutter dial "◎"

T 2 : for Battery (+) at the shutter dial "◎"

T 3 : for X-contact

T 4 : for Battery (-)

B. Parts 1/2

Parts	Tester Range	Tester terminal		Tester indicator & others
		Red	Black	
1) Germa diode	X100	Pin 5 of IC	White lead wire of MC.	Moves widely
		Reverse of above		Moves slightly
2) Moving coil Capacitor C2	X100	(-) Pole of C2	Pin 7 of IC	Moves widely and then returns to Zero
3) Moving coil	X 1	White lead wire	Brown lead wire	Moves in limit 5Ω to 10Ω (Moving coil should oparate)
4) B C.lamp with Battery	D C 10 V	Red lead wire	Orange lead wire	With the BC.button depressed, should point 6 V.
B C.lamp without Battery	X 1	Red lead wire on BC.	Red lead wire on printed circuit board	With the BC.button depressed. should not move
		Orange lead wire on BC.	Blue lead wire on printed curcuit board	" Ditto "

Note : As Germa diode has a special character that is to send electric current only in one way direction, if you insert ± poles of the Battery Upside-down, the current is off.

If above check for the BC.lamp is O K, but the lamp does not illuminate yet, change the BC.lamp to new one.

I C	Battery	S.P Dial	Tester Range	Tester terminal		Tester indicator & others
				Red	Black	
Pin 1	With	1/1000 (SLS 1/500)	D C 10 V	Pin 1	Pin 4	Points 6 V.
	With-out		X 1	SW 2	Pin 1	Current is on at start and of winding
Pin 2	With	1 sec. ≀ 8 sec.	D C 10 V	Pin 2	Body earth	When winding, points Zero volt. While Slow shutter operating, points about 1.32 Volt
Pin 3	With	1 sec. ≀ 8 sec.	D C 10 V	Pin 3	Body earth	When winding, points Zero volt. While Slow shutter operating, points Zero Volt
Pin 4 (Battery pole minus(-),blue lead wire line)	With		D C 10 V	Pin 4	Body earth	When winding, moves in direction to minus(-). While Slow shutter operating, points Zero Volt
Pin 5 (Current to the M C.)	With		D C 10 V	Pin 5	Body earth	" Ditto "
Pin 6 (For M C capacitor C2)	With		D C 10 V	Pin 6	Body earth	" Ditto "
Pin 7 (Battery pole plus(+),red lead wire line)	With		D C 10 V	Pin 7	Body earth	When winding, points zero volt. While Slow shutter operating, 6 Volt

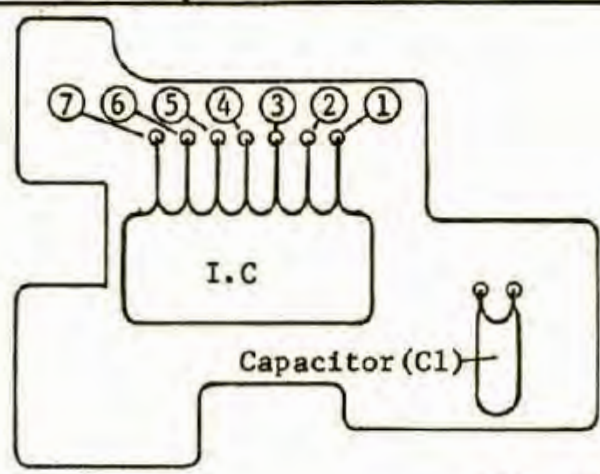


Fig. 94

C. Main cause for Battery exhaustion

Main cause	Battery	Tester Range	Tester terminal		Tester indicator
			Red	Black	
Touch of main switch SW 1 contacts	With	D C 10 V	Body earth	Pin 4 (I C)	When releasing at Slow shutter speed, points under 6 Volt..... exhausting
M C. Operation	With-out	X 1	White (lead wire of MC)	Brown	Moves in limit 5Ω to 10Ω. (M C.should operate)
Short of M C.lead wires (White and Brown)	With-out	X 1	Body earth	White, Brown mutually	If shorted, indicator needle moves
Short of lead wires of Battery chamber	With-out	X 1	Body earth	Blue, Red mutually	" Ditto "

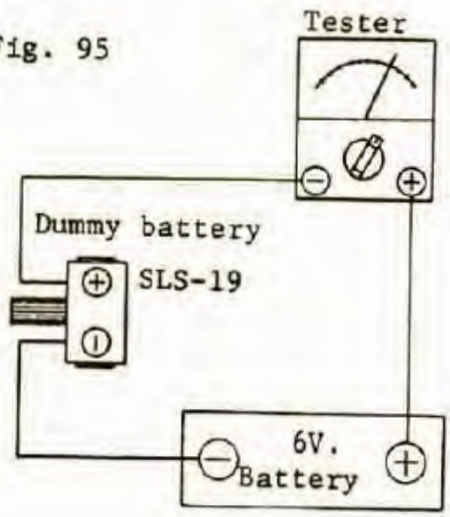
※ Special check method of Battery exhaustion with dummy Battery

Check points	S.P.Dial	Tester Range	Tester indicator
Short, broken and malsolder of lead wires for Battery chamber and M C. Dirty shaft of M C.	At any shutter speed O K except ◎	1. First release shutter at "DC mA 25" 2. Next shift it to "DC mA 0.05"	Should come down less than 5μA within 10 sec. to 15 sec.

Note : Checking method of the Battery leak with Dummy battery and Tester.

1. Remove the battery from camera body and then put the SLS-19 Dummy battery into the chamber.
2. Make electric circuit among the Tester, Dummy battery and 6V Battery as shown in Fig. 95.
3. Checking procedure is shown above, "Battery exhaustion".

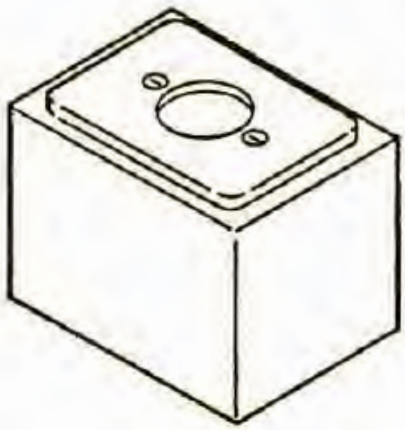
Fig. 95



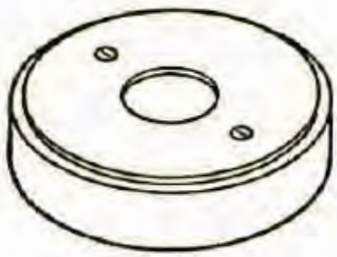
Special Tool List and Special Measuring Instruments for Mamiya M645

Instrument No.	Description and Use
SLS-1	Adjusting Body flange back and Parallelism

Standard gauge bar.
(Exclusively used for Inst No. U-1)

SLS-2	 Adjusting Body flange back and Parallelism

Camera Body supporter
(Exclusively used for Inst No. U-1)

SLS-3	 Adjusting Body flange back and Parallelism

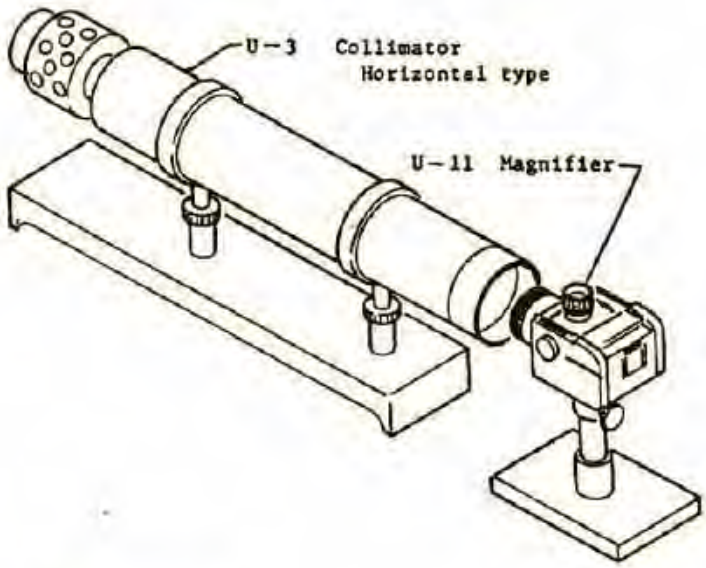
Parallel disk gauge
(Exclusively used for Inst No. U-1)

Finder infinity check collimator

(Horizontal type)

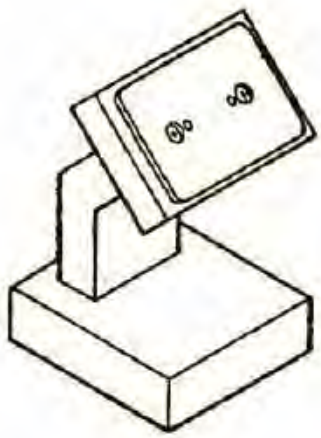
U-3

U-11



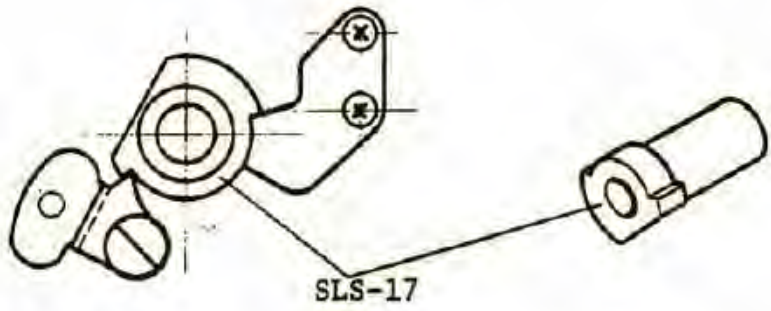
Magnifier

SLS-5



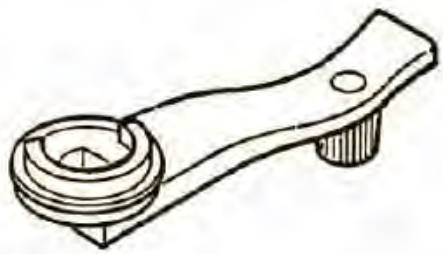
Mirror 45° checking stand

SLS-17



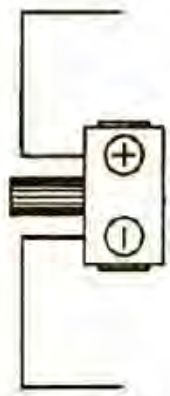
Position gauge for determining SLS15611 Stopper

SLS-18



Winding crank lever
Temporarily use for repair work

SLS-19



Dummy Battery for checking battery leak